MAY 1954

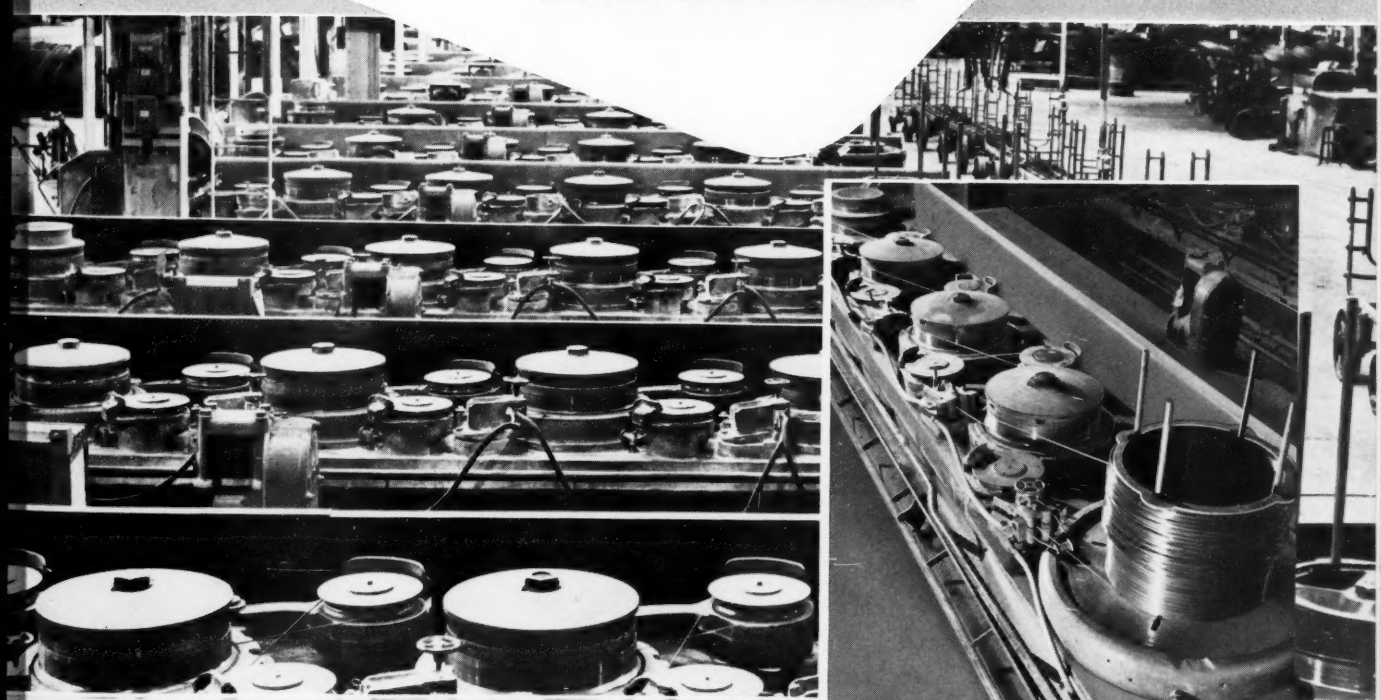
WIRE AND WIRE PRODUCTS

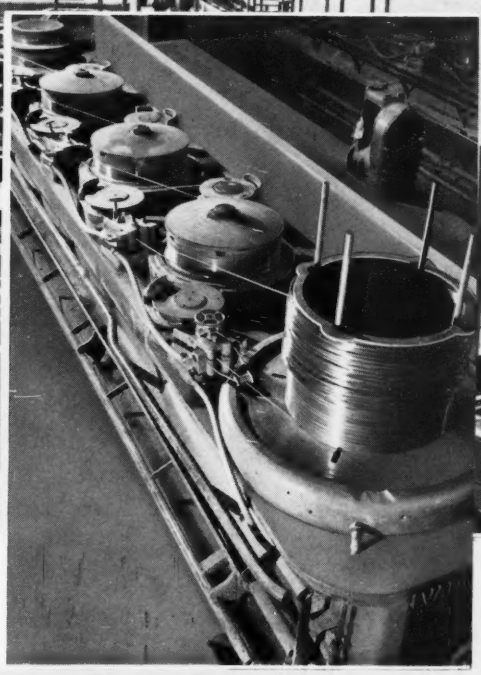
Vaughn® MOTOBLOX®

FOR HIGH CARBON AND ALLOY
INCLUDING STAINLESS WIRE . . .

AIR AND WATER COOLING—COMBINED FOR TOP PERFORMANCE

ASSURING LOW TEMPERATURE
FROM START TO FINISH . . .
WITHOUT EXCESS STORAGE



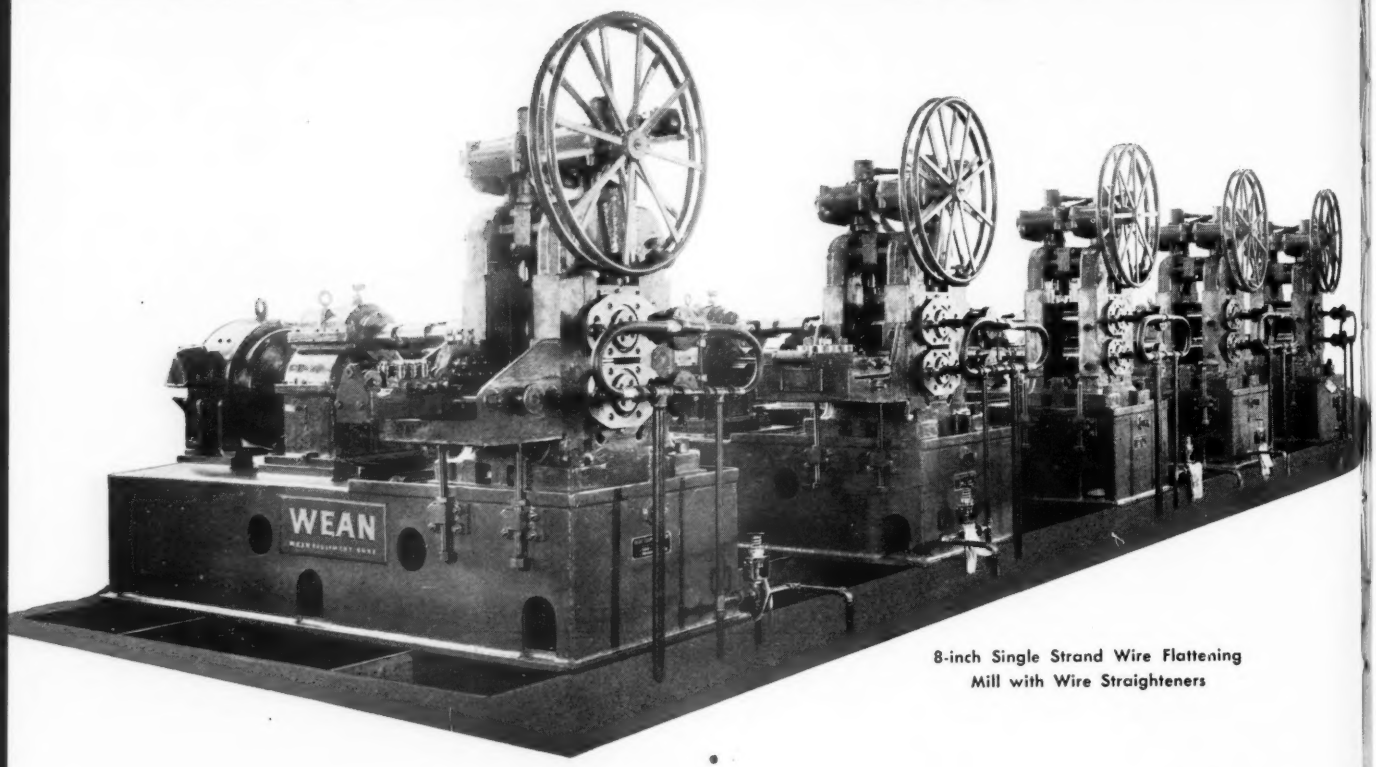


THE VAUGHN MACHINERY COMPANY
CUYAHOGA FALLS, OHIO, U. S. A.
COMPLETE COLD DRAWING EQUIPMENT—Continuous or Single Hole . . . for the Largest Bars and Tubes . . . for the Smallest Wire . . . Ferrous, Non-Ferrous Materials or their Alloys.

"Quick on the Draw!

OFFICIAL PUBLICATION OF THE WIRE ASSOCIATION

Wean



8-inch Single Strand Wire Flattening Mill with Wire Straighteners

A COMPLETE ENGINEERING SERVICE FOR WIRE MILL INSTALLATIONS

Complete Installations for Electro Galvanizing, Hot Dip Galvanizing, Patenting, Tinning, Wire Flattening, Nail Galvanizing and Blueing.

Complete Equipment for the Manufacture of Hexagon Netting, Hinge Joint Fence and Barbed Wire.

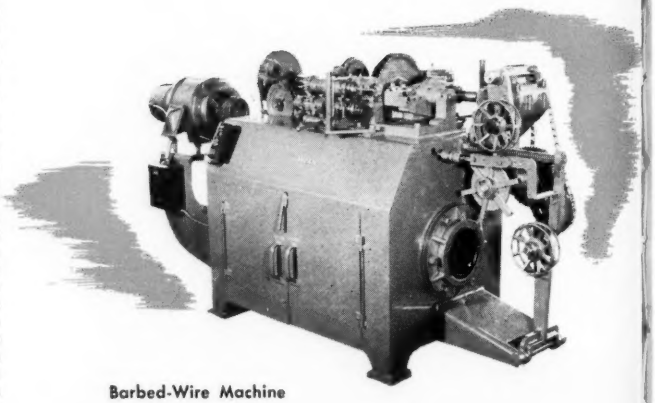
CHECK WEAN FIRST FOR WIRE MILL EQUIPMENT

STRIP MACHINERY

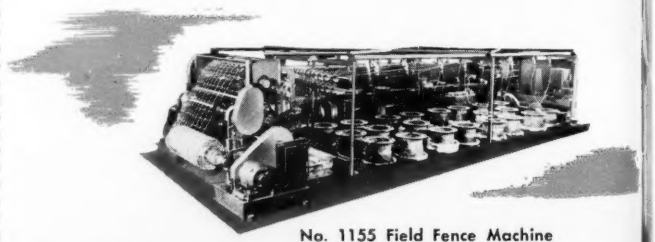
Slitting Installations, Cut to Length Installations, Bearing Metal Coating Installations, Two-Hi Rolling Mill Applications, Strip Grinding Installations, Levelers, Uncoilers, Pinch Rolls, Shears for Strip Processing lines.

WEAN EQUIPMENT CORPORATION

22800 LAKELAND BLVD. • CLEVELAND, OHIO



Barbed-Wire Machine



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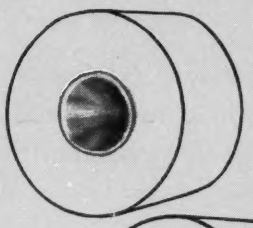
When you specify **FIRTHALOY**, you are assured of close co-operation between your tool and die maker and experienced Firth Sterling Service Engineers . . . "teamwork" that adds up to maximum performance and increased production.



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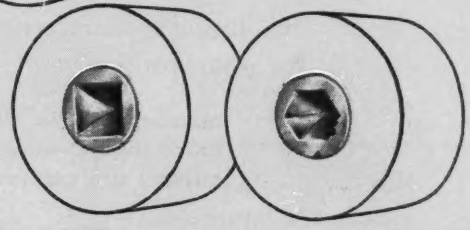
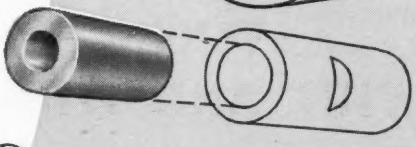
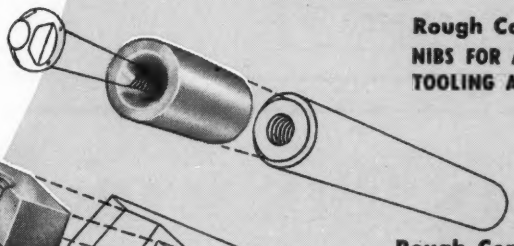
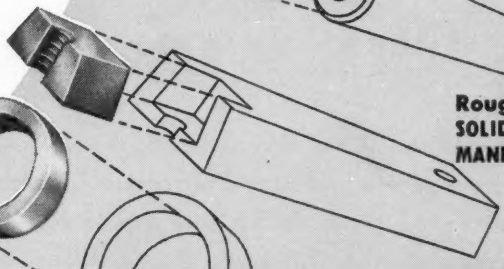
ROUND AND SHAPE DIES FOR WIRE, BAR AND TUBE DRAWING





Rough Cored
NIBS FOR ALL HEADING TOOLING APPLICATIONS





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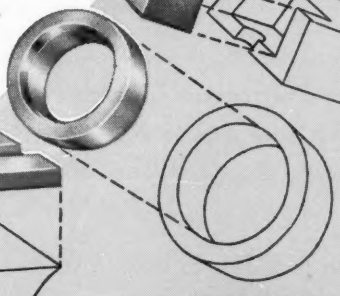
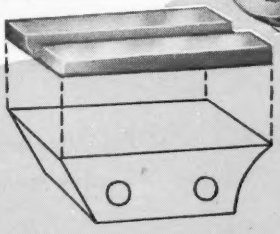
SOLID AND SHELL TYPE MANDREL NIBS FOR TUBULAR PRODUCTS



Carbide
INSERTS FOR NAIL TOOLING APPLICATIONS

Rough Cored
NIBS FOR EXTRUDED AND DEEP-DRAWN PRODUCTS



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Hot-Dip Tank Tinner

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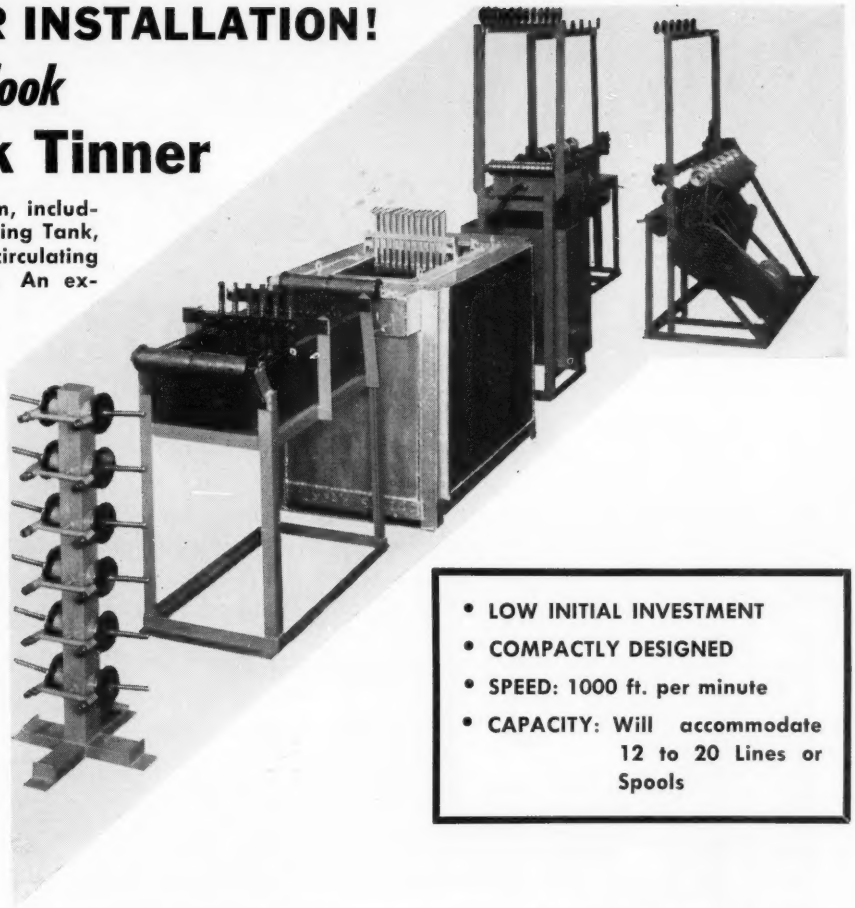
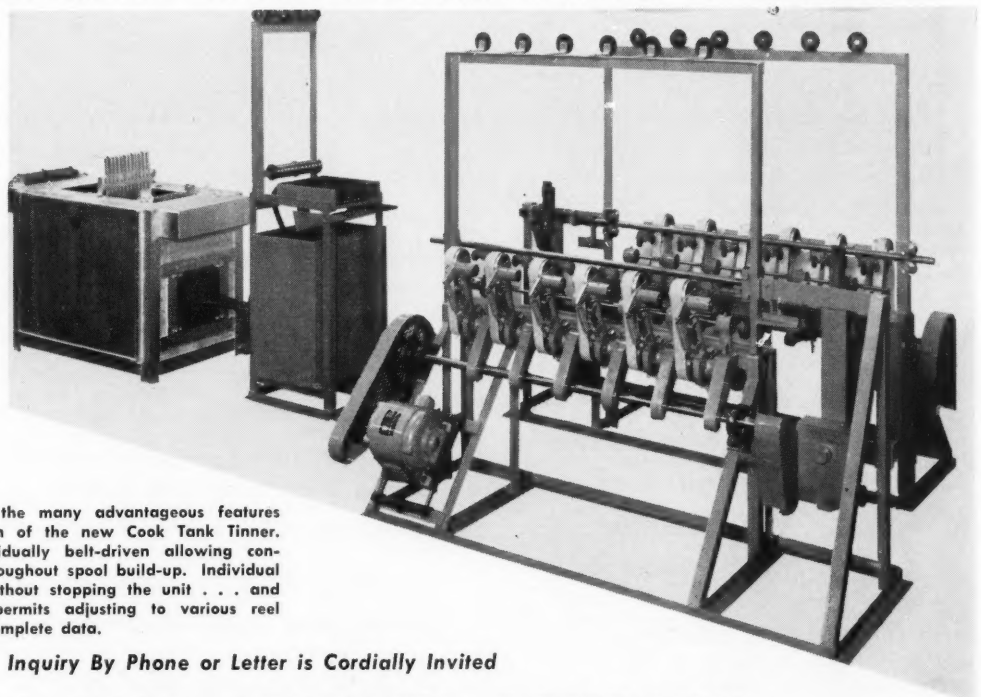


- LOW INITIAL INVESTMENT
- COMPACTLY DESIGNED
- SPEED: 1000 ft. per minute
- CAPACITY: Will accommodate 12 to 20 Lines or Spools

- CAN BE BUILT TO ACCOMMODATE CUSTOMERS' SPECIFICATIONS AS TO SUPPLY AND TAKE-UP SPOOLS.



Here are just a few of the many advantageous features incorporated in the design of the new Cook Tank Tinner. Each take-up spool individually belt-driven allowing constant linear wire speed throughout spool build-up. Individual spools can be removed without stopping the unit . . . and the traverse mechanism permits adjusting to various reel widths. Let us send you complete data.

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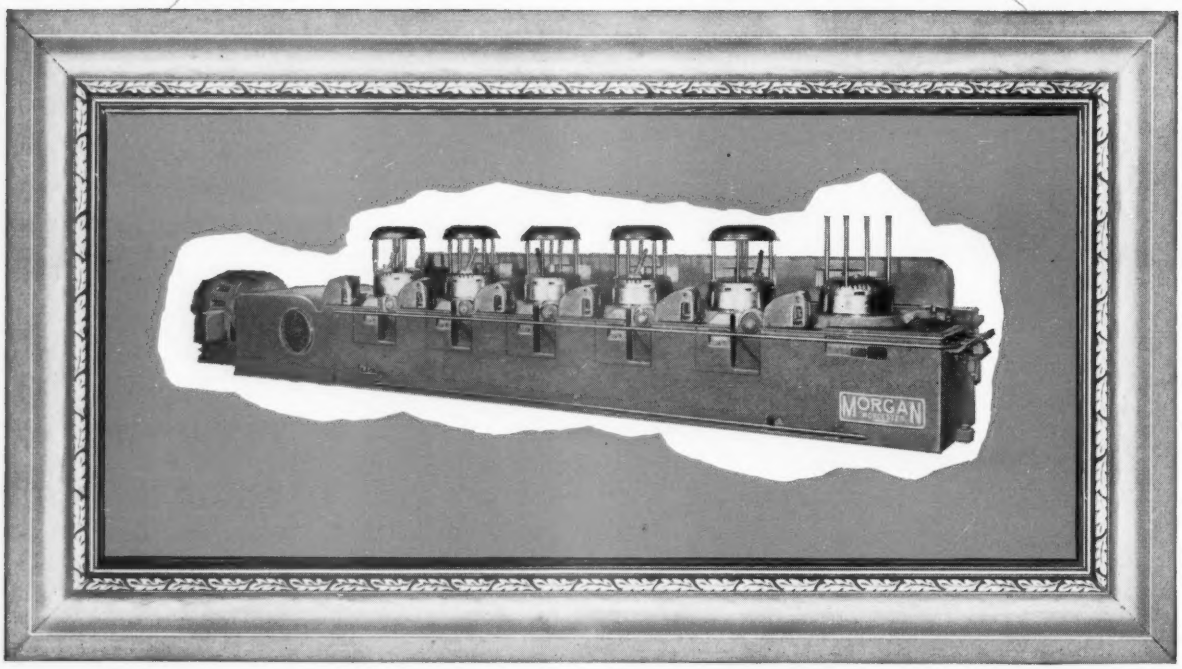
MASTERPIECE *for Wire Drawing* *by* MORGAN-CONNOR



Type BW Morgan-Connor Wire Machine

A good product depends on the efficiency of the machine that makes it.

With Morgan-Connor Wire Machines, efficiency means *air cooling* that really cools . . . to permit drawing all sizes of wire at high speeds. It means no-slip operation . . . it means compactness to save space . . . it means low die costs. It means, too, *savings on power* because of single motor operation.

Morgan-Connor makes the efficient wire machine to make *your* product good.

WM-83

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WIRE AND WIRE PRODUCTS*

Reg. U. S. Pat. Off.

A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable.

DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 29 MAY, 1954 No. 5

Designated as Official Publication By The Wire Association

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WIRE and WIRE PRODUCTS is indexed regularly by Engineering Index, Inc., New York, N. Y.

RICHARD E. BROWN. President and Publisher

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Publication Office: Jersey City, N. J.
Executive Office: 453 Main St., Stamford, Conn.
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WIRE & WIRE PRODUCTS, Vol. 29, No. 5, May, 1954. Publication Office at One Sherman Avenue, Jersey City, N. J. Executive Office 453 Main Street, Stamford, Conn. Published monthly by the Quinn-Brown Publishing Corp., Richard E. Brown, President; R. S. Spengel, Sec'y and Treas. Subscription Price: U. S. $8.00; Canada, $8.00 per year; Domestic 75 cents per copy; Foreign 90 cents per copy, except October Convention Issue and January Proceedings Issue, $1.25 per copy; Foreign $10.50 per year. Entered as second class matter at the Post Office, Jersey City, N. J. under the act of March 3, 1879.

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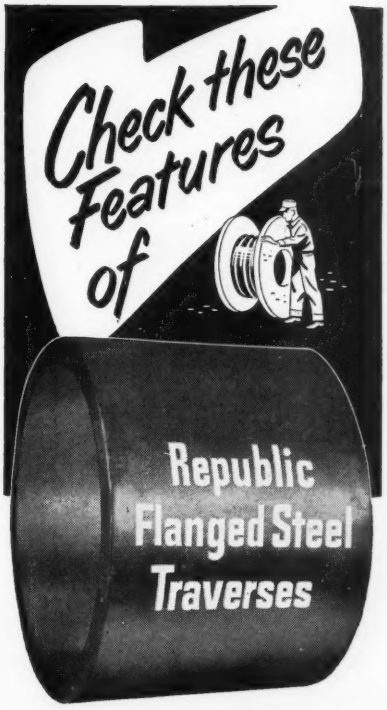

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(COLD ROLLED)

in Coils or Straight Lengths

COMPLETE METALLURGICAL SERVICE

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Shaped Wire in Coils or Straight Lengths, Ferrous or Non-Ferrous.

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PRECISION SHAPED WIRE DIVISION

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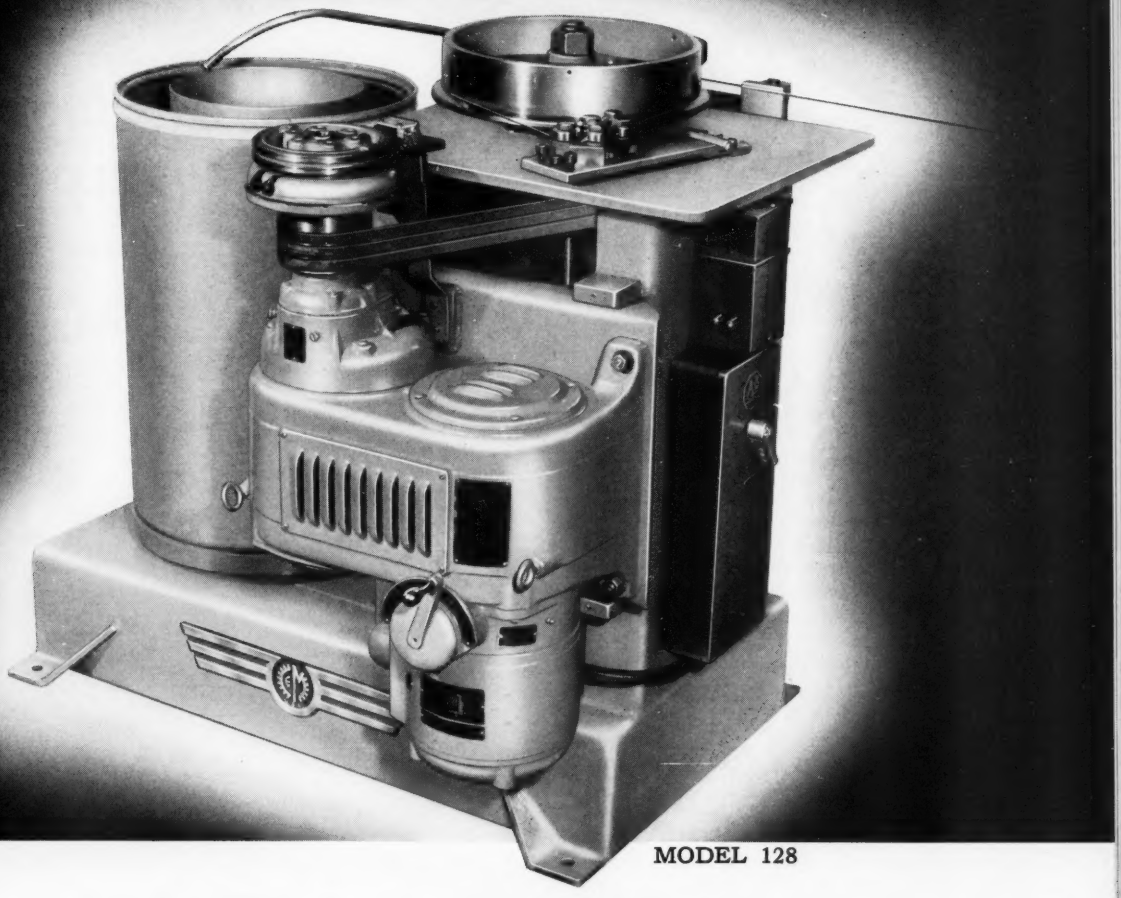
The NEW Coulter & McKenzie PAYOFFPAKAGER



MODEL 128

Look! No Hands!

Now you can pour wire in one continuous 600 pound strand * into a single package...no tying...no contamination...no scrap!!!

DIRECT PACKAGING of continuous strand material is performed rapidly with the new Coulter & McKenzie Model 128. It is adaptable also for single-die reduction, tinning take-up, and respooling. Applicable to the following materials:

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Insulated Wire	Low Carbon Steel	Tubing
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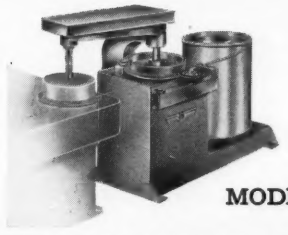
SPEEDS to suit all materials and operations.
POWER to pour the finest strand or reduce and package the coarsest material.



MODEL 126

CONTINUOUS WIRE PACKAGING ATTACHMENT

Write for engineering questionnaire. Low cost models available for vertical or horizontal power take-off.

Other machines are available for continuously drawing and packaging fine and coarse wire.

*Steel Wire.

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OPPOSITE RAILROAD STATION

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BRIDGEPORT 3, CONNECTICUT, U. S. A.

SINCE 1843

INCORPORATED 1881

FOR BONDING STRANDED WIRE and LOCALIZED ANNEALING of SPRING WIRE

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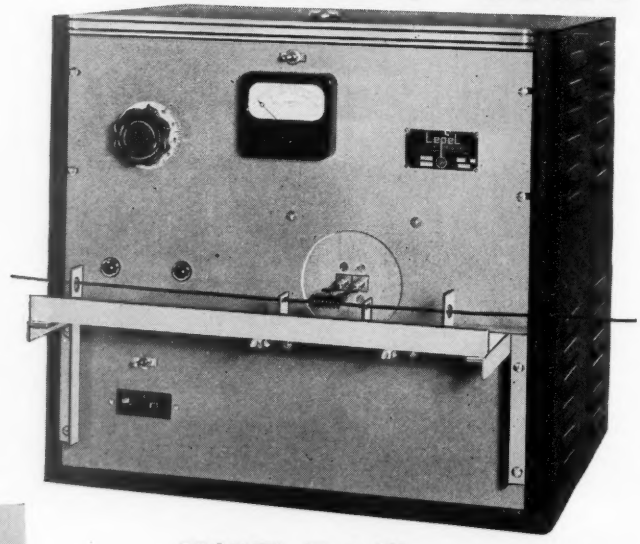
LOW COST—PORTABLE HIGH FREQUENCY *Induction* HEATING UNIT

This newly developed tube operated high frequency generator is ideal for bonding together the ends of the individual strands of multi-strand wire and cable, thus eliminating the necessity of tin-dipping the ends of the wire after cutting and stripping.

This highly versatile unit can be used in conjunction with an automatic wire cutting and stripping machine. When used in this manner, the wire is fed continuously through the load coil of the generator and the heating cycle is synchronized with the stroke of the wire cutter. The wire is heated and bonded at successive points where the subsequent cutting and stripping operations occur. The same set-up may be used for localized annealing of spring wire except for the use of a spring winding machine instead of the wire cutter and stripper.

The Lepel Model T-1-W is also ideally suited for heat treating thin parts such as surgical needles and dental burrs, and joining various types of wire products.



MODEL T-1-W

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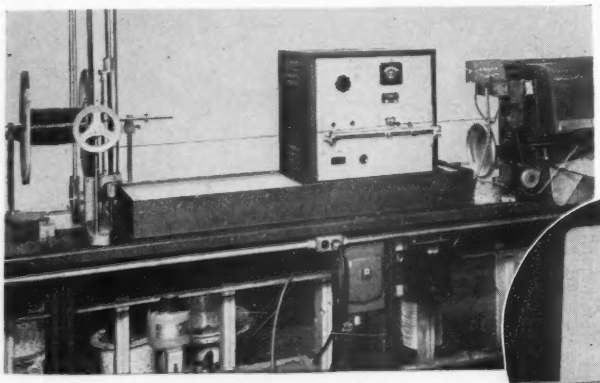
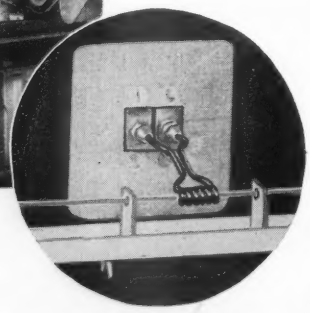
F. O. B. FACTORY



Set-up for automatic bonding, stripping and cutting in the wire department of the Federal Telephone and Radio Corp.



Enlarged view of the coil arrangement with the insulated wire passing continuouly through the heating coil.

SPECIFICATIONS AND FEATURES

The power input is 1.6 KVA at 115 volts, 60 (or 50) cycles, single phase.
A stepless Thyratron Control is incorporated to adjust output power for heating various thicknesses of wire and other parts.
The water consumption is negligible, requiring but a fraction of a gallon per minute. Ordinary tap water pressure is sufficient.
As a precautionary measure, a magnetic trip circuit breaker protects the generator from overloading.
This unit can be operated by a footswitch or with an automatic timer.
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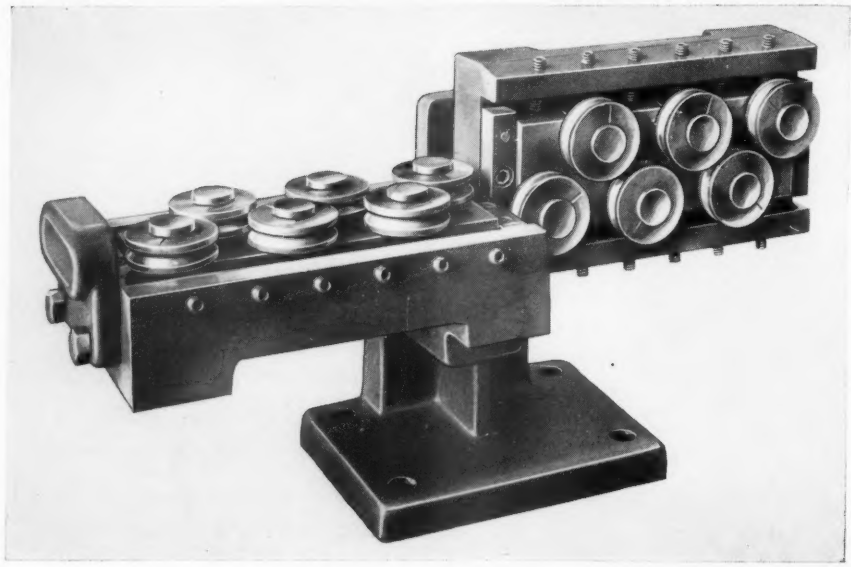
ROLL TYPE WIRE STRAIGHTENER

Twelve Roll Central Foot



Shuster Roll Type Wire Straighteners are generally used in connection with automatic wire forming machines, headers, power presses and similar equipment. As the wire is drawn through, the straightener removes the natural curve of the coil, neutralizing any tendency to kink, snarl or twist. The wire enters the dies of the forming machines straight—ready for fast production runs.

There is no feeding attachment and the wire must be pulled through manually or mechanically. Rolls are grooved for straightening round wire and square stock. Machines are equipped with **needle bearings.**

This type is made in six sizes to accept wire from .045 to 9/16″ diameter. For Flat Stock send dimensions.

We shall be pleased to furnish any further information you may wish.

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MODEL	WIRE DIAMETERS	PRICE
ROL1	.045 to 3/32"	$170.00
ROL2	3/32" to 5/32"	195.00
ROL3	5/32" to 7/32"	230.00
ROL4	7/32" to 5/16"	275.00
ROL5	1/4" to 3/8"	545.00
ROL6	3/8" to 9/16"*	860.00

*Normal capacity ⅜" to ½", 9/16" grooving on request

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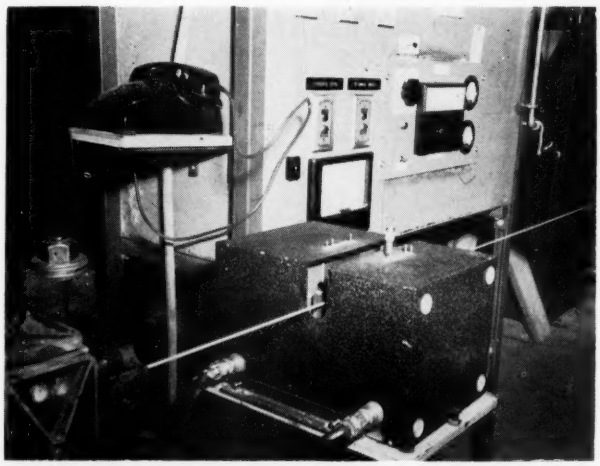

The large cable manufacturer who installed this Serc Diamacontrol has ordered several more.

With this Electronic Micrometer, you can automatically control the diameters of your wire and cable, in-process,

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and REDUCTION of
SCRAP
MAN-HOURS
COSTS

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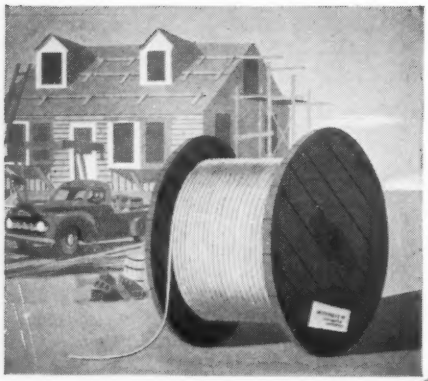
Electrical wire and cable coatings

Call for CELLUFLEX* 179C



- **FLAME RESISTANT**
- **HIGH DIELECTRIC STRENGTH**
- **LOW WATER AND OIL EXTRACTION**
- **RAPID FUSION**

CHEMICAL PROGRESS WEEK-MAY 17-22

DESCRIPTIVE DATA

CELANESE* PLASTICIZER	GRADE	APPEARANCE	COLOR APHA Max.	SPECIFIC GRAVITY @ 20/20°C.	ACIDITY	ESTER VALUE % Min.	PERMANGANATE TIME, Min. (in Minutes)	REFRACTIVE INDEX @ n $\frac{25°C.}{D}$
LINDOL* tricresyl phosphate coal tar base	Technical	Clear transparent liquid	75	1.165 ± .005	0.01 (3)	99	30	1.553
CELLUFLEX* DBP dibutyl phthalate	Technical	Clear transparent liquid	50	1.045 ± .001	0.01 (2)	98	—	1.490
CELLUFLEX* 179C tricresyl phosphate petroleum base	Technical	Clear transparent liquid	150	1.165 ± .005	0.01 (3)	99	30	1.553
CELLUFLEX* TPP triphenyl phosphate	Technical	White flakes	20 (4)	1.202 ± .005 (1)	0.003 (3)	99	30	1.550 (1)
CELLUFLEX* 112 a mixed ester	Technical	Clear transparent liquid	40	1.210 ± .005	0.01 (3)	99	30	1.560
CELLUFLEX* DOP dioctyl phthalate	Technical	Clear transparent liquid	50	0.986 ± .002	0.01 (2)	98	—	1.485

(1) @ 60° C. (2) % as phthalic, max. (3) % as phosphoric, max. (4) molten

Celluflex 179C—tricresyl phosphate, commercially developed by Celanese — is the standard of comparison among flame-resistant plasticizers for electrical applications. It has very low volatility, excellent solvent power, a high degree of permanence ...producing tough flexible vinyl coatings for transformer wires and electrical cable.

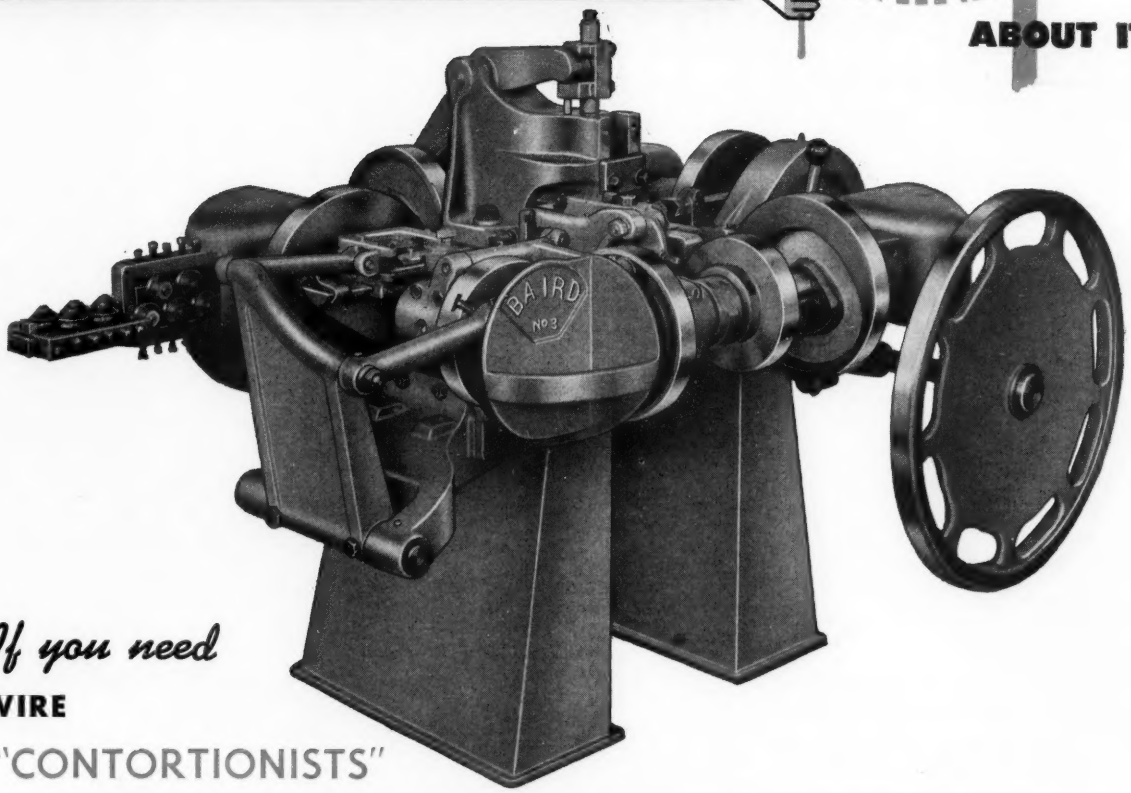
Celanese, pioneer in the production of petroleum-based and coal tar-based tricresyl phosphate plasticizers, today offers an expanding list of Celluflex plasticizers designed to fit a broad range of applications. Celanese Technical Service and Application Laboratories are fully equipped to assist you in formulations and test. Bulk stocks of Celanese Plasticizers are maintained at centrally located distribution points for prompt delivery. Wire manufacturers can take advantage of price differential and freight saving by ordering combination shipments—compartmented tankcars, tankwagons, or mixed drum carloads.

Celanese* CHEMICALS

Celanese Corporation of America
Chemical Division, Dept. 590-E
180 Madison Avenue, New York 16, N. Y.

. . . IF IT'S A HIGH PRODUCTION PROBLEM . . .

ASK BAIRD ABOUT IT



If you need

WIRE

"CONTORTIONISTS"

The BAIRD FOUR-SLIDE is your FORMING MACHINE

There is probably no machine in the world that can make a greater variety of parts . . . or produce them any faster . . . than the Baird Four-Slide. It seems that there must be a limit to the fashioning of small wire and metal ribbon products *by hand* . . . and then tooling a Baird Machine to make them *automatically.* Yet, new shapes are continuously submitted to us . . . and we still find the solutions.

Taking coiled wire from a reel, the machine straightens, feeds, and cuts off the required length . . . then forms and ejects the part. Different sizes of standard machines give you a selection of wire lengths to 32½" . . . dia. to ½" or flat ribbon metal products to 1½" wide. Special attachments such as *secondary cut-offs, lettering, form raising, pin pulling, nail pointing, vertical forming and stripping, ring setting, etc.,* extend the versatility of operations.

Thus you may purchase your machines for specific repetitive production, then, at any time, add special attachments as your production requirements indicate. At all times you may count on Baird engineers for development of tooling from your parts or specifications.

This is your profit-making machine. Send for the Baird Four-Slide Bulletin.

2BA54

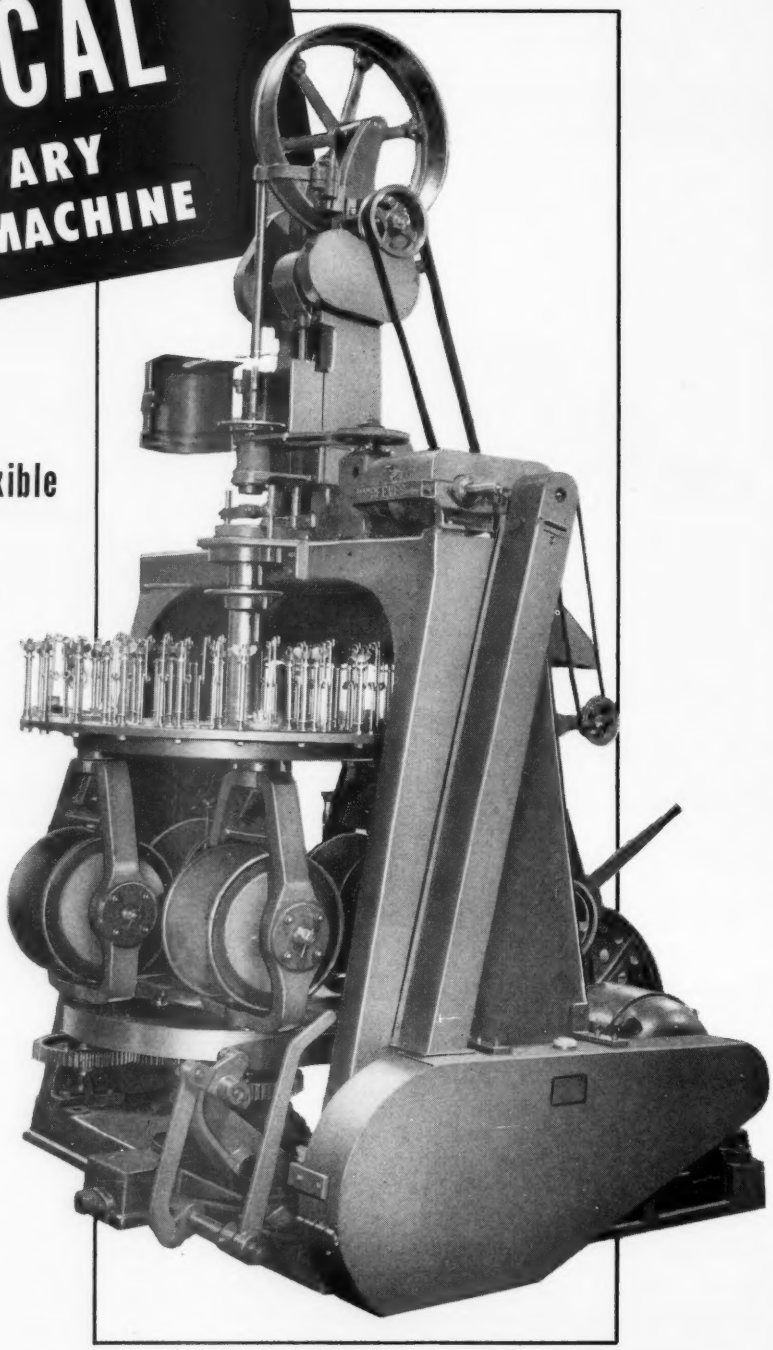
THE BAIRD MACHINE COMPANY

STRATFORD CONNECTICUT

WHERE YOU WILL GET THE HELP OF SPECIALISTS ON THESE ESSENTIAL PRODUCTION PROBLEMS:

AUTOMATIC MACHINE TOOLS • AUTOMATIC WIRE & RIBBON METAL FORMING MACHINES • AUTOMATIC PRESSES • TUMBLING BARRELS

VERTICAL
PLANETARY CABLING MACHINE



. . . for fast, uniform production of small, flexible rubber covered cables

This cabler occupies little floor space and is a big producer of S. J. and similar cords. The rotor operates at 133 rpm for either right hand or left hand twists, and change gears provide 27 different lays from .300″ to 6.52″ inclusive.

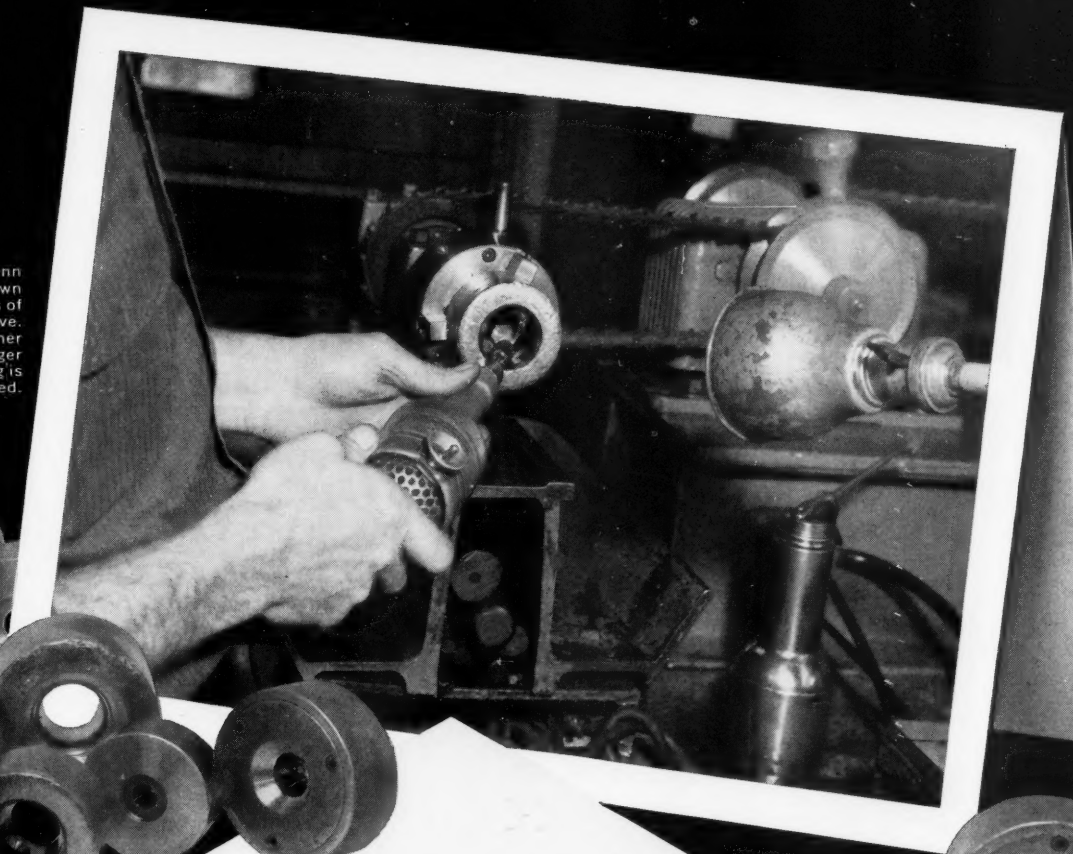
Like other Nebuttco Wire Making Machinery, this machine is dependable — engineered to operate on heavy production schedules, day in and day out. Virtually maintenance-free, and easily loaded and operated, here's a machine that's a consistent profit-maker:

Ask us for complete information and prices. New England Butt Company, 304 Pearl Street, Providence 7, R. I., James Day (Machinery) Ltd., 28 Maddox St., London W-1, England.

NEBUTTCO

NEBUTTCO

BRAIDERS • CABLERS • TAKE-UPS • BUNCHERS • STRANDERS • TAPING MACHINES



. . . Approximately 2000 Penn awing dies like those shown are polished with 5 grams of Elgin DYMO Diamond Abrasive. Elgin Diamond is faster, cleaner . . . and dies operate longer before sizing and polishing is again required.

ELGIN DIAMOND

COSTS LESS THAN

2 CENTS PER DIE!

. . . AT PENN BRASS and COPPER COMPANY of Erie, Pennsylvania, leading producer of tubing products. A 20% reduction in expensive die lubricating compounds and smoother tubing surface is also credited to the use of Elgin's DYMO-C* Diamond Abrasive in drawing die polishing operations. Elgin Diamond, crushed, precision graded at Elgin and combined with an exclusive color identified vehicle in DYMO, will assure uniform, predictable polishing results and important savings in your plant. Be certain of the finest of fine finishes . . .

Save Time and Money the safe way...

with ELGIN Diamond!

*C for carbides.

DYMO-C

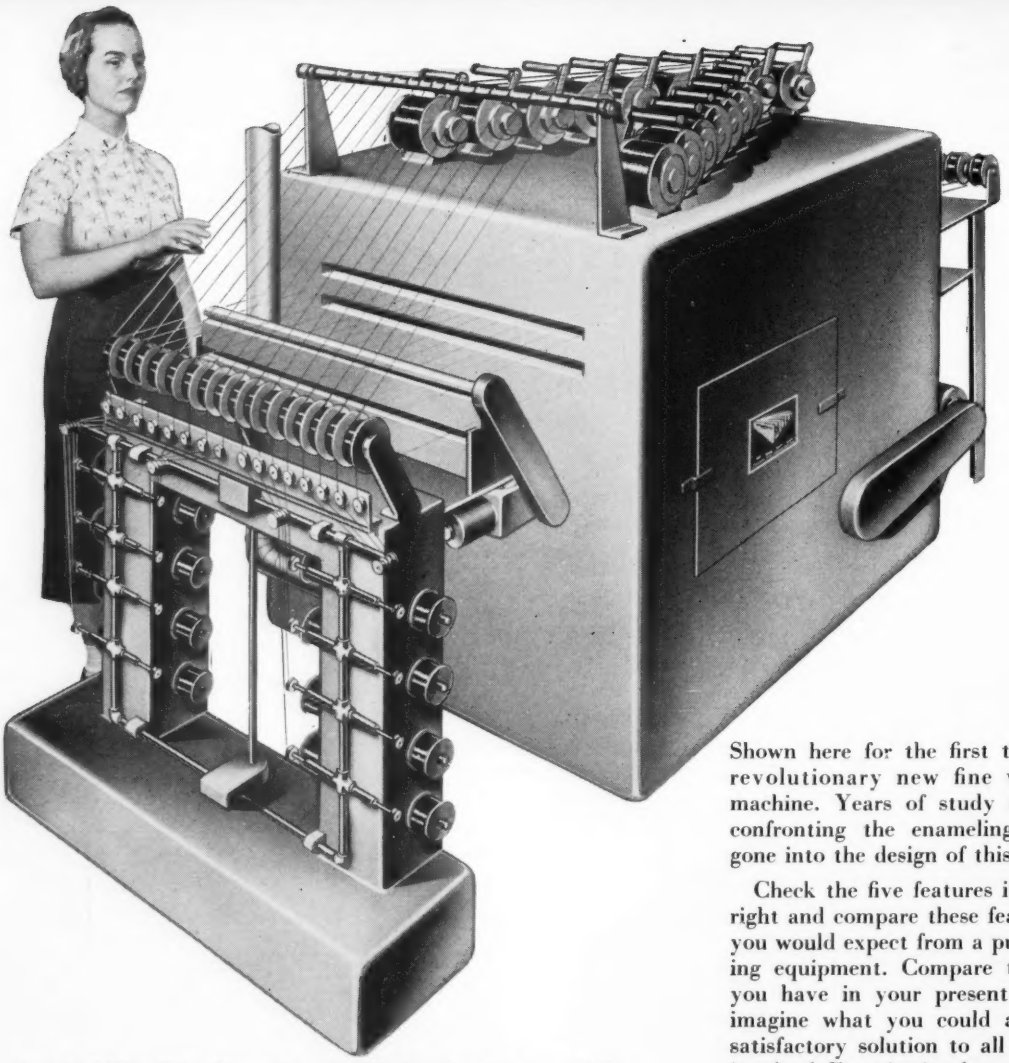
. . . FOR CARBIDES

ELGIN NATIONAL WATCH COMPANY

ABRASIVES DIVISION, DEPT. G ELGIN, ILLINOIS

HOW to step up your enameled wire production

a NEW Concept of Enameling Ovens



A typical Fine Wire Enameling installation showing some of the modern-design features which aid in increasing wire production.

Shown here for the first time is MOCO'S revolutionary new fine wire enameling machine. Years of study of the problems confronting the enameling industry have gone into the design of this equipment.

Check the five features in the box at the right and compare these features with what you would expect from a purchased enameling equipment. Compare them with what you have in your present equipment and imagine what you could accomplish by a satisfactory solution to all of the problems involved. Examine its clean, compact appearance. It will indicate just what you can expect from these new equipments.

. . . . . by MOCO

5 EXCLUSIVE FEATURES OF MOCO ENAMELING MACHINES

1. **ECONOMY**—advanced design offers low fuel consumption—less maintenance costs. The original cost of this Enameling Oven has been cut to a minimum—also, a small floor space is required for installation.

2. **HIGH OUTPUT**—enameling speeds—with minimum wire breakage—have been raised to a new high.

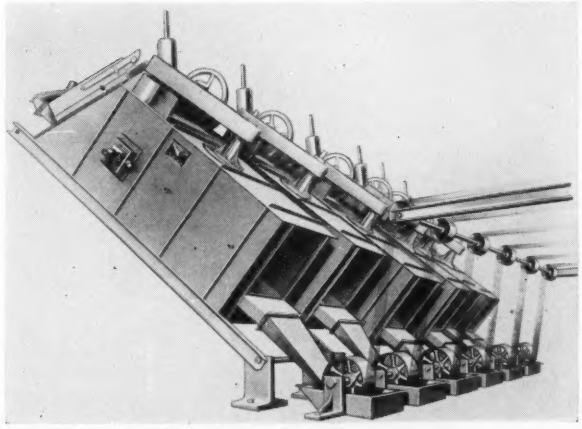
3. **VERSATILITY**—a wide range of insulating materials may be handled.

4. **EASE OF OPERATION**—the MOCO Enameling Oven is designed to eliminate any climbing or stooping. A new rapid start-and-stop device increases production.

5. **LOW OPERATING TEMPERATURE**—a high degree of heat transfer efficiency allows lower operating temperature with additional savings in fuel.

also A NEW STRAND ANNEALING OVEN WITH HIGHER OPERATING SPEEDS

Revolutionary design features eliminate or greatly reduce *any* annealing problems. Advanced mixing and burning equipments are utilized which exclude the need for troublesome external sources of steam or other inert atmospheres. Tried and proven in over 30 successful installations, these ovens are daily producing high quality wire at a greater range of speeds with less operating and maintenance costs.

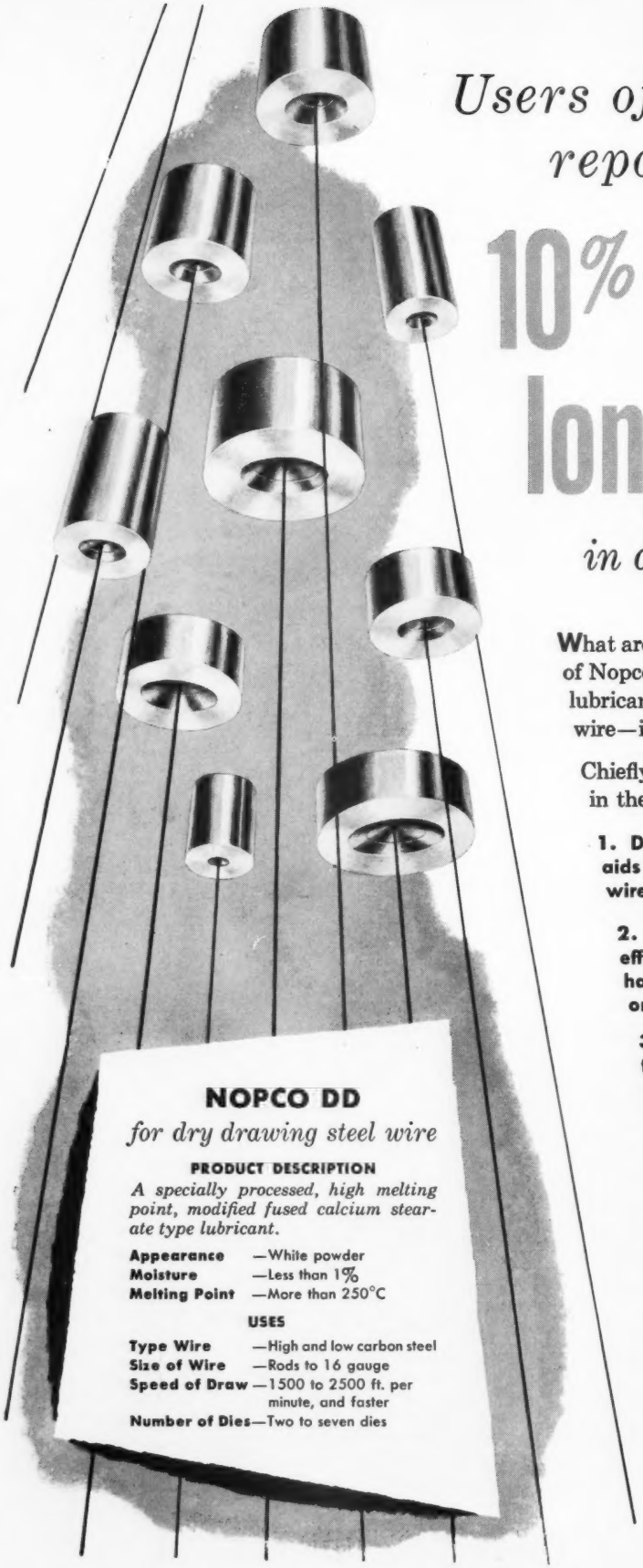


A typical installation of 6 inclined model MOCO annealing ovens operating in series with wire enameling equipment. Also available in horizontal or vertical mounting positions.

FOR COMPLETE INFORMATION on MOCO wire product equipment, call in your MOCO representative or contact MOCO in Detroit today.

MICHIGAN OVEN COMPANY

425 BRAINARD • DETROIT 1, MICHIGAN



Users of **NOPCO® DD** *report:*

10% to 50% longer die life

in dry drawing steel wire

What are the reasons why Nopco DD, recent product of Nopco research, is almost certainly superior to the lubricant you are now using for dry drawing steel wire—including galvanized or plated wire?

Chiefly, because it excels all other lubricants in these 3 ways:

1. DD's specially processed calcium stearate base aids in surface tension—makes the soap stick to the wire all the way through the drawing process.

2. DD's soft film of combined coating and soap effectively separates wire and die—as compared to harsher soaps which have an abrasive action on the die.

3. Perhaps most important of all, because the melting point of DD is over 250°C. It does not "burn out" and lose effectiveness like other low melting point soaps often used.

Though Nopco DD has been available only a year, plant after plant has adopted it—strictly as a result of its performance in their own comparative tests. Isn't it high time *you* tried it? We'll gladly help by furnishing full information and samples for testing. Write today.

NOPCO DD

for dry drawing steel wire

PRODUCT DESCRIPTION

A specially processed, high melting point, modified fused calcium stearate type lubricant.

Appearance	—White powder
Moisture	—Less than 1%
Melting Point	—More than 250°C

USES

Type Wire	—High and low carbon steel
Size of Wire	—Rods to 16 gauge
Speed of Draw	—1500 to 2500 ft. per minute, and faster
Number of Dies	—Two to seven dies

NOPCO CHEMICAL COMPANY

Harrison, New Jersey

Cedartown, Ga. • Richmond, Calif.

NOPCO TRADEMARK EVOLVED THRU RESEARCH

ANOTHER IMPORTANT MEMBER OF WATERBURY-FARREL'S LINE OF WIRE-WORKING MACHINERY

HOW THIS WATERBURY-FARREL WINDER puts trolley wire in its place

This new Waterbury-Farrel Trolley Wire Winder has an automatic, hydraulic, spool-traversing feature that assures a very accurate lay of wire.

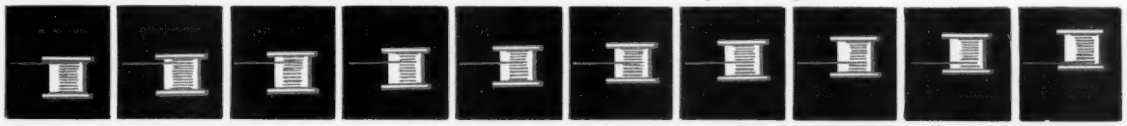
The wire moves straight ahead while the spool itself traverses. It moves across the path of the wire at exactly the right pace to put the wire precisely where it belongs on the spool. A special slip friction device compensates for the build-up of the spool.

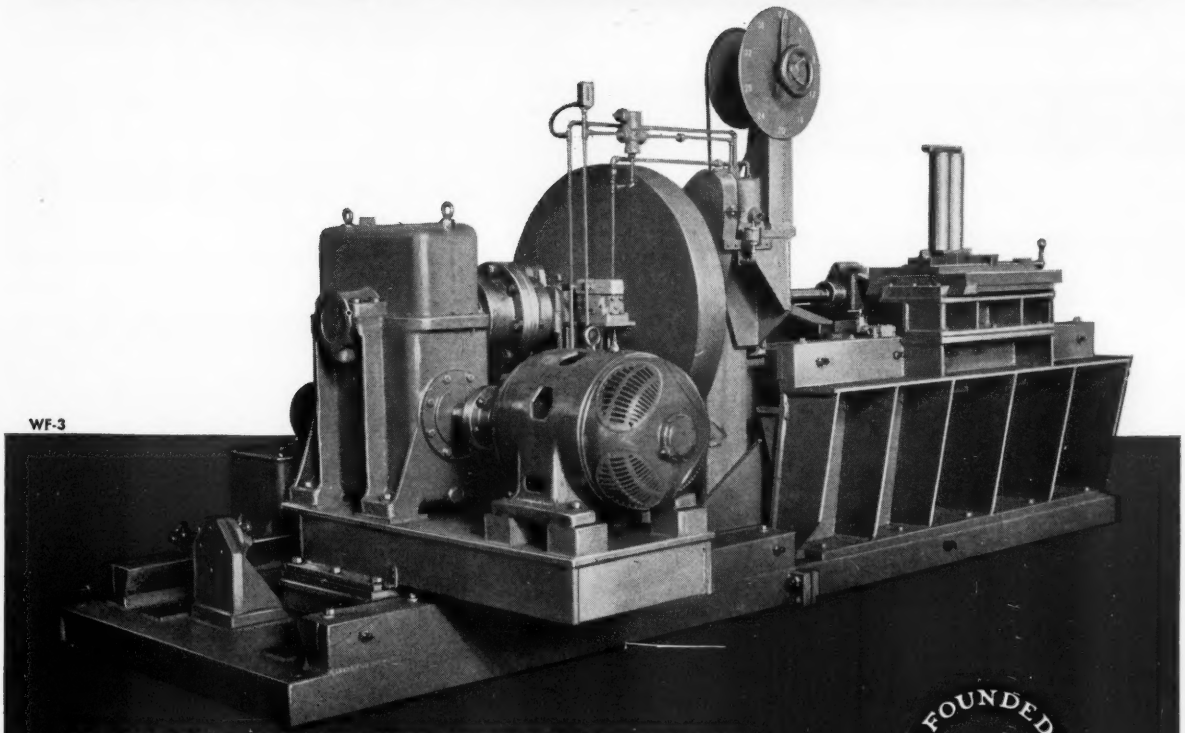
This machine can be furnished to take spools up to 56" O.D., 31" barrel with a 26" traverse. It has a maximum capacity of 7,500 lbs. of wire plus approximately 1,800 lbs. for the spool . . . a total load of 9,300 lbs.

Further information on this machine or on any of the equipment indicated below is available on request.

WATERBURY FARREL FOUNDRY & MACHINE COMPANY
WATERBURY, CONNECTICUT, U. S. A.
Sales Offices: Chicago, Cleveland and Millburn, N. J.

The spool traverses . . . the wire stays straight





WF-3

A FEW OF THE MANY TYPES OF METAL WORKING MACHINERY MADE BY WATERBURY FARREL

WIRE MILL EQUIPMENT—Continuous Fine Wire Drawing Machines • including Upright Cone and Tandem types • Bull Blocks • String-up Machines • Spoolers, Etc. • *COLD PROCESS BOLT AND NUT MACHINERY*—Headers (all types) • Re-headers • Trimmers • Thread Rolling Machines • Slotters • Nut Tappers, etc. • *POWER PRESSES*—Crank • Cam and Toggle; also Rack and Pinion Presses • Transfer Presses • Multiple Plunger Presses • Hydraulic Presses, etc. • *MILL MACHINERY*—Rolling Mills • Wire Flattening Mills • Chain Draw Benches • also Slitters • Straighteners • Pointers Swagers • Cut-off Saws • Coilers • Winders, etc.

FOUNDED WATERBURY FARREL 1851

In Equipment, Experience Counts . . .

STEELSKIN Lubricants

—and how to use them...

(No. 2 of a Series)

This is second in a series of advertisements cataloging the complete line of Steelskin Lubricants. Keep this for handy reference.

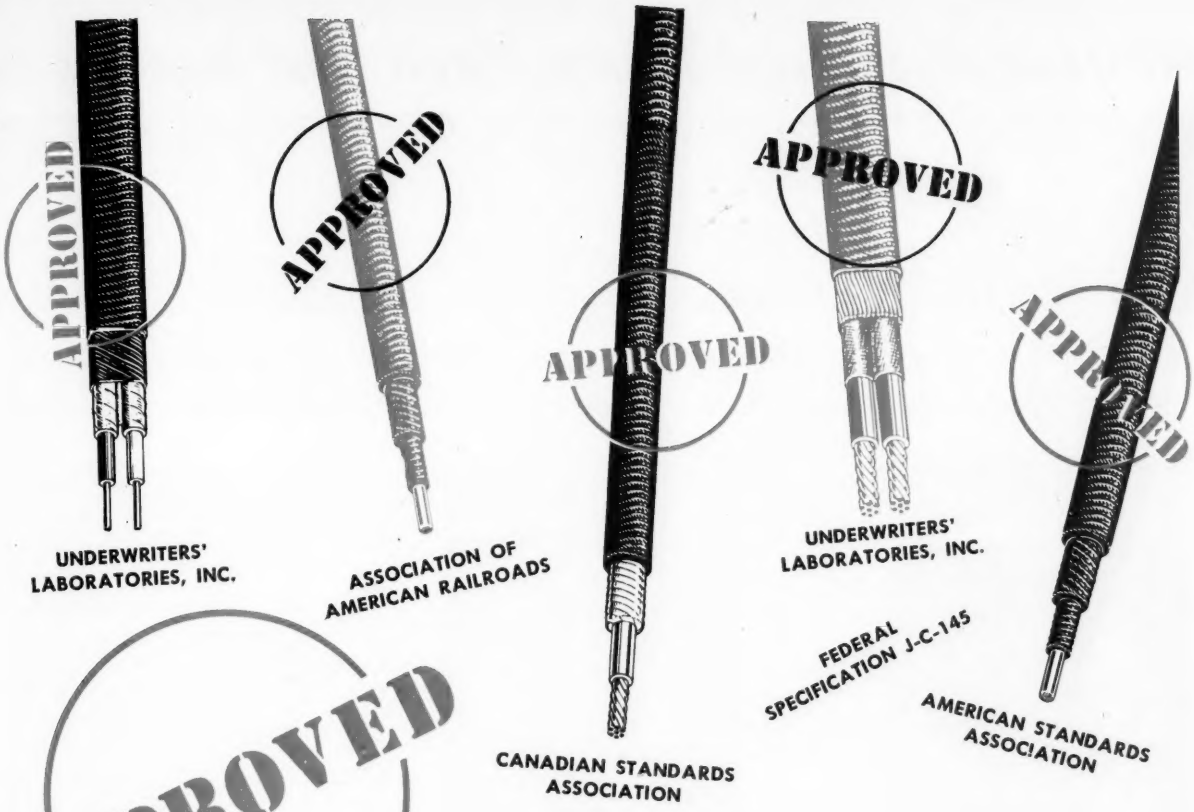
PRODUCT	DESCRIPTION	SHIPPING INFORMATION	USES
#76	Metallic Soap Powder	Fiber Drums 275# Net	For drawing rod or wire coated with lime or STEELSKIN W-Coating Compound. End uses include wire for springs, nails, rope, galvanizing, tire bead, poultry netting, screen cloth, etc.
GOLDEN Redskin	Blended Crystals	Fiber Drums 400# Net	Production of straw-colored and liquor-finished wire. Eliminates the waste of the metallic-tin process.
X-2	Compounded Soda-Soap Powder	Fiber Drums 275# Net	A general-purpose dry powder for high- and low-carbon rod and wire. More readily cleaned after drawing and annealing. For welding wire and coat-hanger wire (on continuous machines) using a light lime.
560-M	Paste Compound	Steel Drums 480# Net	A water-emulsifiable compound resistant to lime, used to produce a bright finish on bar stock prior to straightening and cutting.
X-Bright Grease	Paste Compound	Steel Drums 480# Net	A one-hole lubricant for producing extra-clean extra-bright wire.
Z-Bright Grease	Paste Compound	Steel Drums 480# Net	A multiple hole lubricant for producing bright grease-drawn wire.
DS-8-B	Compounded Soap Powder	Fiber Drums 300# Net	For use on descaled rod to produce a clean finish for electric-welded fabric wire, welding wire, etc.
PF Bars	Waxy Solid	Fiber Drums 275# Net	For use on the take-up frames of patenting units to prevent binding and facilitate bundle removal.

Steelskin LUBRICANTS

R. H. MILLER

Company, Inc., Homer 1, N. Y.

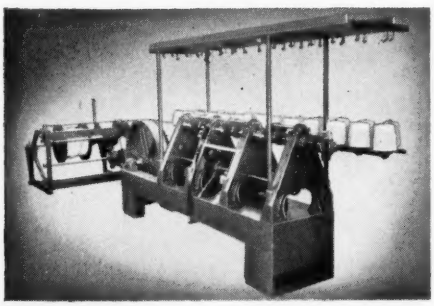
SOAPS AND COMPOUNDS FOR WIRE DRAWING, TUBE DRAWING, DEEP DRAWING AND STAMPING.



WIRE AND CABLE COVERING—AT HIGH SPEED

...WITH THE FIDELITY SINFRA KNITTER

WEATHERPROOF WIRE • BUILDING WIRE • NON-METALLIC SHEATHED CABLE • SERVICE ENTRANCE CABLE • OTHER GOVERNMENT & INDUSTRIAL WIRES



Sinfra Machines are available for covering wire sizes up to and including 500,000 C/M.

Your wire and cable can carry all the important stamps of approval—when you use Fidelity Sinfra Knitters in your covering operations. Wire and cable produced with these high speed wire covering machines meet the highest standards of recognized testing bodies . . . carry their authorized approval for industrial and military application.

Leading manufacturers agree, too, that the Sinfra Knit process has proven superior to conventional braiding methods of wire and cable covering. A Fidelity Sinfra Knitter covers up to 2500 feet of wire or cable per hour. Automatic electric stop motions and accurate product control permit the production of a better product at lower cost.

Many additional advantages of this amazing machine are described in Catalog W. Write for your copy today . . . or see the Fidelity Sinfra Knitter in the new show rooms at our plant.

Designers and Builders of Intricate, Automatic Precision Machines

SINCE 1911

FIDELITY MACHINE COMPANY, INC.

3908-18 FRANKFORD AVENUE, PHILADELPHIA 24, PA.

Export Dept.:
25 Beaver Street, New York 4, N. Y.

Canadian Representative:
The E. V. Larson Co. Ltd. Toronto, Ontario, Canada.

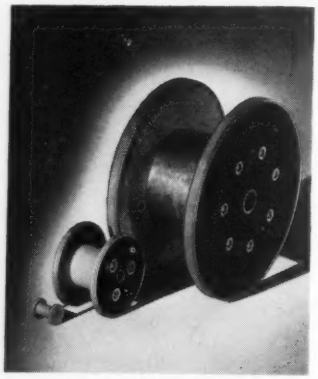
Whatever Your Requirements, Direct Your Inquiries to

HUBBARD—SPOOL and REEL HEADQUARTERS

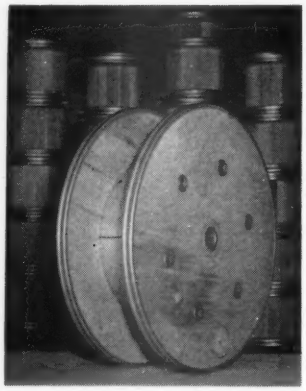
• ONE DEPENDABLE SOURCE FOR ALL TYPES •

SHIPPING • SHOP • STEEL • ALUMINUM • WOOD • PLYWOOD • SPECIAL

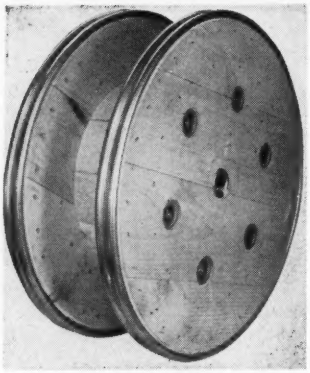
TRAVERSES • FLANGES • CAST • ARBOR PLATES • WASHERS • LAGGING



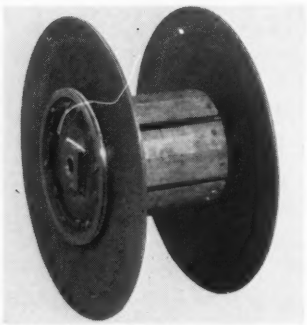
Plywood—Process and Returnable Shipping Reels.



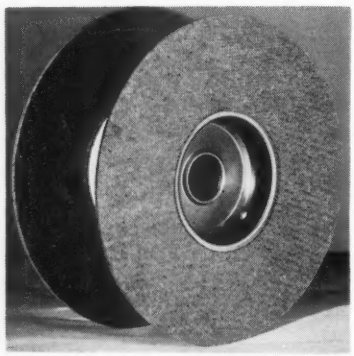
Dimension Lumber for Returnable Reels.



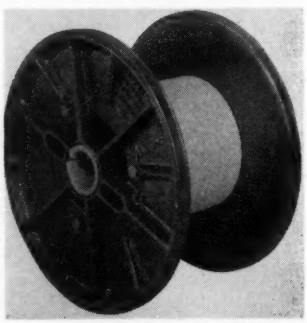
Nailed Reel. Banded for Returnable Types.



Special Reels Made to Your Designs



Reel with masonite flange and cardboard hub assembled with steel end washers for domestic or export shipment of wire, tape, braid or other materials.



Light Alloy Cast Reels for P.ocess & Shipping

The HUBBARD LINE of Spools and Reels includes all types and combinations of constructions for shipping, shop and processing for wire, rope and electric wire and cable, standard or made to your specifications.

We invite your inquiries.

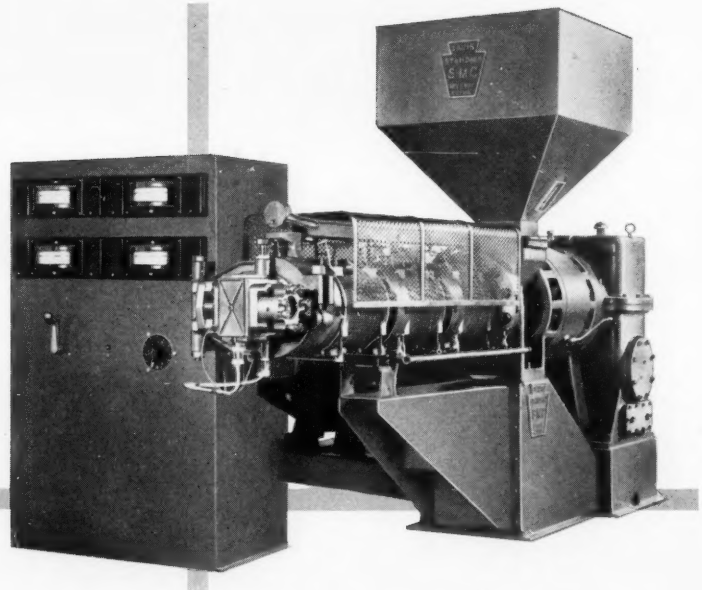
HUBBARD SPOOL COMPANY

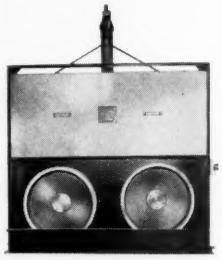
GARRETT • INDIANA

Telephone: 840

"THE BIGGEST NAME IN SPOOLS AND REELS"

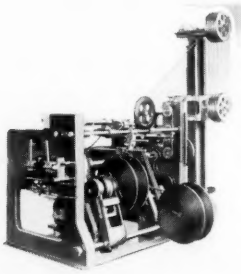
PROFITABLE EXTRUSION





DAVIS-STANDARD CAPSTAN

Drag and pulling type. Supplied for almost all wire plant needs. Aluminum or cast iron drums, grooved or flat, in any radius desired. Gear reducers standard, four-speed transmission optional.



DAVIS-STANDARD TAKE-UP

Great new efficiency. Quiet, vibrationless. No gears or clutches. Operates positively at high speeds. Reel drive by multiple V-belts. Automatic brake. Totally new traverse mechanism. Speed range choice for constant tension control. Built in two sizes: for reels 12" to 24" and 24" to 36".

The kind of production necessary for profits in today's market is made possible by Davis-Standard extruding equipment.

Davis-Standard extruders, custom-built for long, continuous service, give reliable production with the minimum maintenance. Exclusive "Stream-Flo" head assures high speed, continuous production. "Therma-Fin"* heating jacket permits a broad range of controlled temperatures to be obtained. These extruders are engineered to precisely meet virtually any operating requirement or condition.

Complete details sent promptly

*Patent pending

DS

DAVIS-STANDARD SALES CORPORATION

14 WATER STREET MYSTIC, CONNECTICUT

Sole Selling Agents For

THE STANDARD MACHINERY COMPANY

EXTRUDING MACHINES AND MOLDING PRESSES

World's Largest Manufacturers of Custom-Built Extruding Machines

USE
"America's Finest
Wire Drawing Lubricants"

MAY WE HELP YOU?

SERVICE CENTERS

ARTHUR J. O'MARA, c/o Standard Industrial Compounds Co., Millbury, Mass.

BRUCE SIEMON, 2400 Morrow Place, Pittsburgh 34, Pennsylvania.

CHARLES P. ORR, Caledonia Park, Fayetteville, Pennsylvania.

JOHN A. MORITZ, 719 St. Andrews Drive, Crete, Illinois.

ERIC RYLANDER, 4600 W. Ferdinand Street, Chicago 44, Illinois.

EARL BOWERS, 66 Dolphin Drive, St. Petersburg 6, Florida.

ARNOLD WEIGEL, 4600 W. Ferdinand Street, Chicago 44, Illinois.

wire drawing lubricants Standard INDUSTRIAL COMPOUNDS CO., INC.

4600 WEST FERDINAND STREET
CHICAGO 44, ILLINOIS
Telephone: MAnsfield 6-9324-5-6

The answer to most of your questions about stainless steels are right at your finger tips, when you use Crucible's unique new Stainless Steel Selector.

Want to know the machinability characteristics of a stainless grade? Resistance to corrosion or scaling? Physical or mechanical properties? You can get the answers to these and other questions simply by setting the arrow on the Selector slide at the proper window. It's just as quick and easy as that.

And almost as fast as you get the answer, you can get the steel you need. For many of the REZISTAL stainless steels shown on the Selector are carried in stock in Crucible warehouses conveniently located throughout the country.

To get your free copy just fill in and mail the coupon. Better do it now.

HOW THE SELECTOR WORKS:

Start with the problem. For example, resistance to corrosion in contact with copper sulfate. Just set the slide at the proper index number shown on the Selector (in this case on the back), and you have the answer in a second – grades 302 and 316 are fully resistant to this form of attack.

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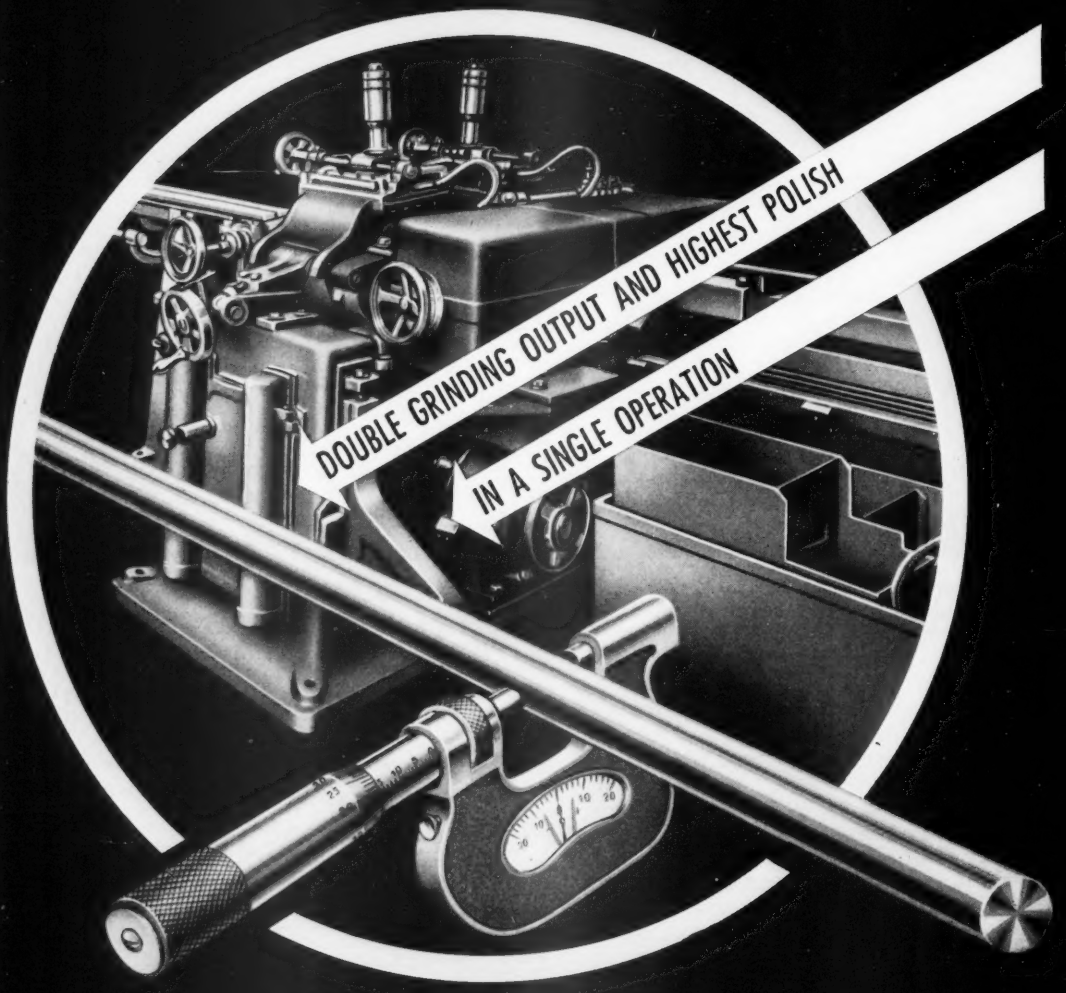

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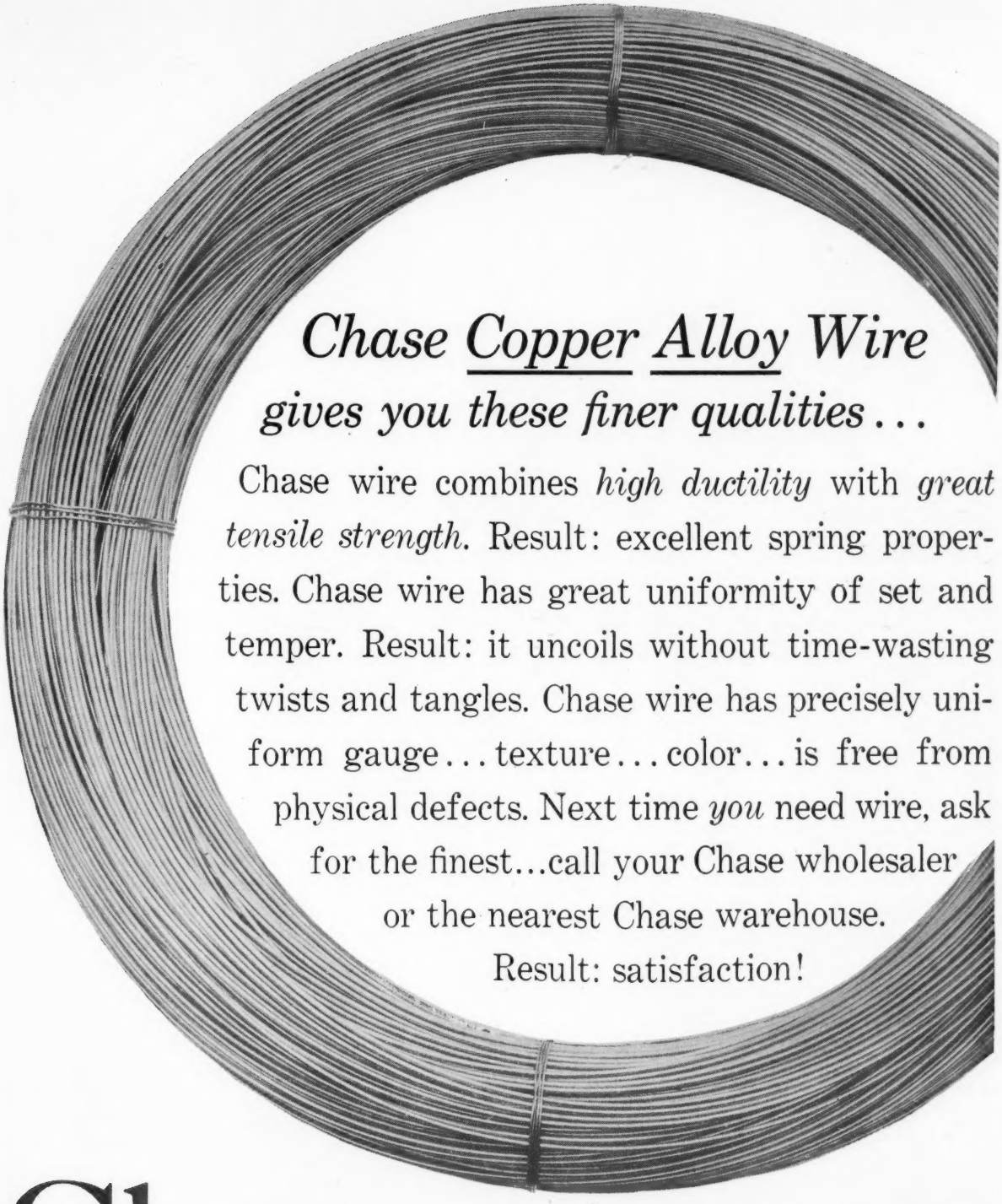

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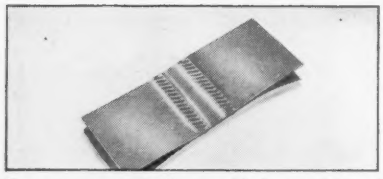

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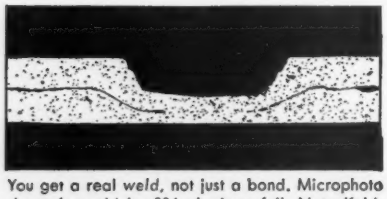

You get a real *weld*, not just a bond. Microphoto shows lapweld in .004 aluminum foil. Note Koldwelded area in center shows actual inter-molecular flow of metal . . . *both* foil sheets become a single homogeneous unit (Photo made by Alcoa Process Dev. Labs., Welding Section, Project K-15).

Koldwelding work-hardens the metal, so weld areas are often stronger than the parent metal itself! Shown is .030 aluminum cable sheathing which was Koldwelded in flat strip, then passed thru machine which wrapped it around a BX-type cable of 4" diameter. Note that neither the great tension nor severe twisting in the machine damaged the Koldweld in the least.

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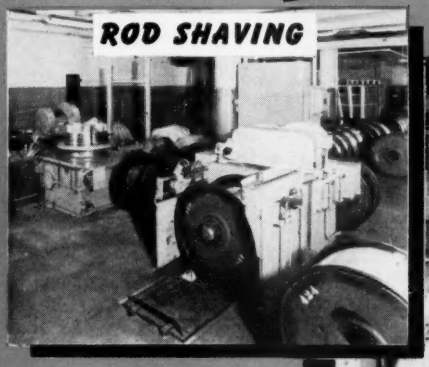
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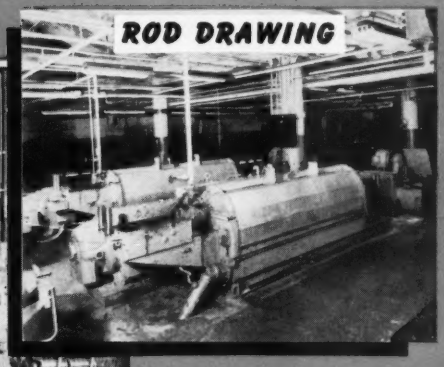
FINE WIRE DRAWING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The Wire Outlook

While the American buyer is not as eager to acquire merchandise as he was last year, there is no sign that he is pulling in on his purse-strings.

Business is still sliding moderately in some quarters, but is picking up in others. Opinions expressed by economic experts vary. Some few expect a mild continuation of the slide, while others look for a gradual improvement, with a marked pick-up in the autumn generally anticipated.

Factory inventories are about a billion dollars below the peak of 47.1 billions last September. This is a healthy sign, especially since the reduction has been accomplished in an orderly fashion. It has been estimated, incidentally, that total sales are off almost exactly the amount of the inventory drop.

The first rise in steel ingot production has been recorded, with the index rising one point to 69 per cent of capacity. Unemployment is no longer rising, appliance sales are going well, automobile sales have improved and the building industry is still operating at boom levels.

The long-range outlook is promising. Electric power consumption, one of the indices of business, is at the record level of 257 billion kilowatt-hours. It is forecast that this consumption will increase in another ten years by 55 per cent, spurred by the need of industry to modernize further its production techniques to lower unit costs as an offset to constantly rising wages.

Labor leaders are regaining some of their former assurance and are now preparing to make new demands. These include moderate wage increases, a guaranteed minimum annual wage, a voice in management's employment policies and something to say about the purchase of labor-saving machinery. Their overall objectives, however, embrace a much broader program, with pressure being put on the members of Congress for a more favorable labor law, higher unemployment pay, further tax cuts, bigger public works and the old price supports for farmers. The whole attitude of labor thinking is toward socialization, which, as we know so well, is only a step toward fascism or communism.

Brass mills have suffered from the reduction in the ammunition program, but tubing, wire and rod are beginning to show signs of taking up a portion of the slack.

Electric wire and cable manufacturers are enjoying a significant up-turn in business. Some of the orders being received are not for current consumption, but represent forward buying. This is probably due to the fact that prices have firmed and further reductions in copper are not expected. Building wire is moving especially well, high voltage underground cable sales are good and wire for appliance manufacturers is in good demand.

In the steel wire field, slight improvements in bookings are being recorded. A more than seasonal demand for merchant wire products—nails, fencing, barbed wire, etc., has been experienced by a number of large mills. Spring wire orders are slightly ahead of estimates. Wood screws and small fasteners are showing up fairly well on volume, but price cutting has eliminated profits on these items.

Aluminum sales have turned upwards. Drawn tubing, bars, rods, wire, ACSR and bare cable, as well as many other forms of the metal are again moving in fair volume. Primary aluminum production is at an all-time high.

The worst of the readjustment is probably behind us. It has proceeded pretty much according to schedule and it was to be expected that in the process of getting back to a peace-time economy, some businesses and individuals would suffer. It has been especially unavoidable as a result of twenty long years of inefficiency, corruption, wastefulness and lack of integrity in high places.

—from the Editor's Desk

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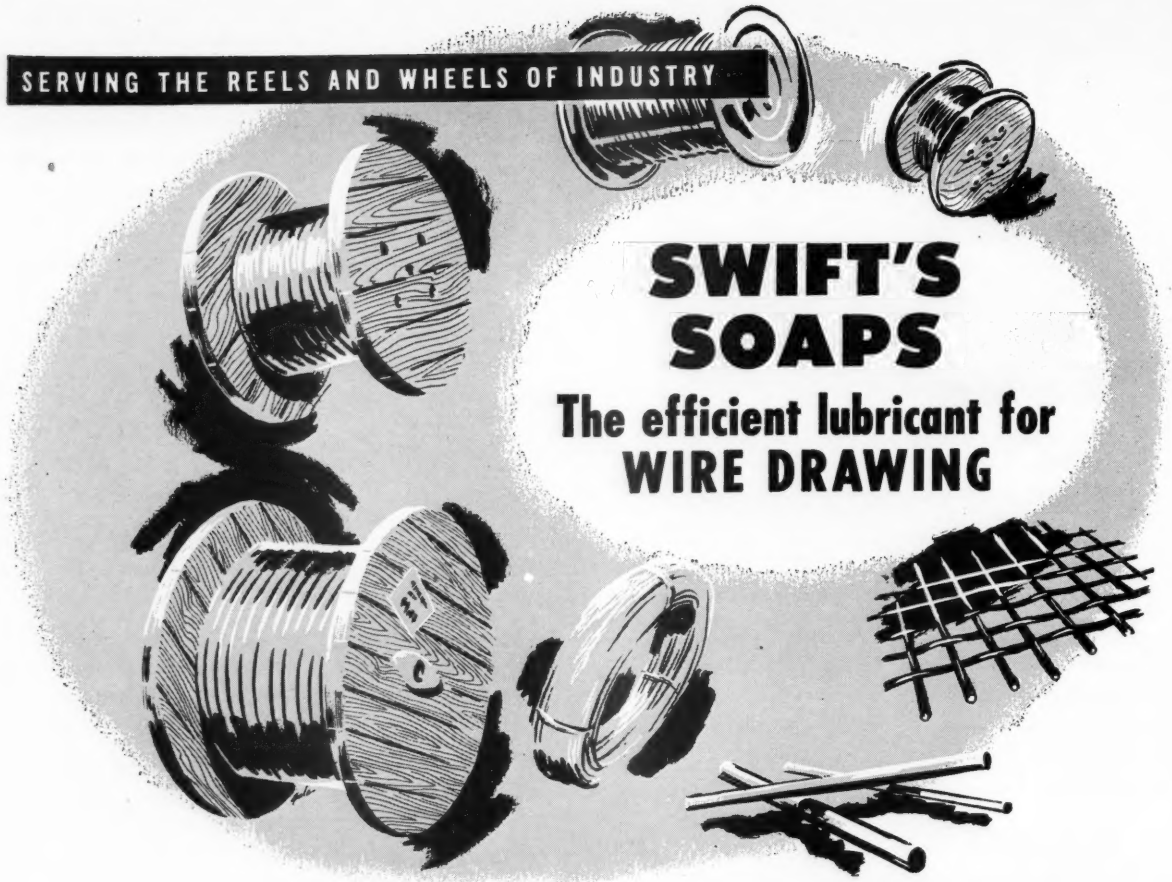

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Vol. 29 MAY, 1954 No. 5

The Progress of Mechanical Descaling of Rods for Wire Drawing

A Symposium

Chicago, Ill., November 10, 1953

CHAIRMAN OF MEETING

Edgar T. Miller, Mgr. Wire Die Sales, Firth-Sterling, Inc.
Pittsburgh, Pa.

PANEL MEMBERS

George Fecson, Die Room Foreman
Pittsburgh Steel Co.
Monessen, Pa.

H. J. Godfrey, Asst. Chief Engineer
Development and Research
John A. Roebling's Sons Corp., Trenton, N. J.

C. F. Wickwire, Vice Pres.
Wickwire Brothers, Inc.
Cortland, N. Y.

Arthur Hedman, Die Room Foreman
Wickwire Spencer Steel Div.
Colorado Fuel & Iron Corp.
Palmer, Mass.

Walter A. Smigel, General Mgr.
R. H. Miller Company
Homer, N. Y.

Allyn E. Harper, Chf. Eng.
Oliver Iron & Steel Co.
Pittsburgh, Pa.

S. L. Stalson, Research Project Eng.
American Steel & Wire Div.
United States Steel Corp.
Cleveland, Ohio

This symposium on the mechanical descaling of rods was presented at the annual Convention of the Wire Association on November 10, 1953, in Chicago, Ill. It represents the very latest thinking on the subject as a result of the work done along these mills as drawn from the experience of various wire mills and suppliers whose researches have been concerned with the many problems involved.

The Symposium Session of the Ferrous Division convened at nine-thirty o'clock, Edgar T. Miller presiding.

★ ★ ★

Chairman Miller: We are scheduled to have a symposium on "The Progress of Mechanical Descaling of Rods for Wire Drawing." We had a short discussion on this subject in Pittsburgh in 1952 and there were numerous requests that we continue this discussion at a subsequent annual meeting. This meeting today is the result of those requests.

★ ★ ★

I think that we were very fortunate to have on the panel this morning seven members who are active in operating mechanical descaling units in their mill. We feel that you have many questions that you would like to have answered and I believe that these men will be able to answer many of them. Of course, we also expect to get a lot of answers from you people in the audience today also. I believe that with your cooperation that we can make this a good meeting.

★ ★ ★

I will introduce the speakers this morning and as I introduce them I will give you a short resume of what they are doing in their particular mills.

★ ★ ★

We have tried to have a member on this panel to cover every phase of mechanical descaling. There are some here from low carbon mills and some from high carbon mills and some who are using other methods of descaling.

There are also die and lubricating men here.

★ ★ ★

The first speaker this morning is **H. J. Godfrey,** Assistant Chief Engineer, Development and Research Division, **John A. Roebling's Sons Corporation** of Trenton, New Jersey.

★ ★ ★

Mr. Godfrey: Mr. Chairman, Members and Guests, I don't know why I was asked to start this thing off with the exception that possibly Ed wanted to start from the bottom and work his way up and when it comes to me and descaling, well, I am right at the bottom of the list.

★ ★ ★

In our efforts to develop the use of mechanical descaling, we have been primarily concerned with the drawing of high carbon steel rods for process wire only. We have not attempted to make any finished products with this method.

★ ★ ★

We are still in the experimental stage, as our experience to date indicates that the economics of the process are somewhat questionable.

★ ★ ★

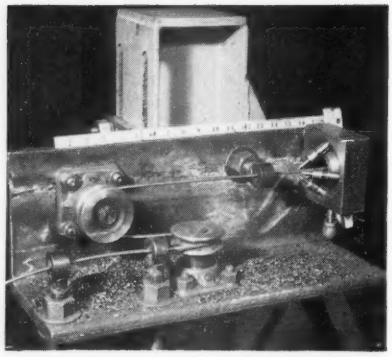
Most of our experimental work has been on .70 and .75 per cent carbon steel rods, .187" and .218" in diameter. The rods have been either air or lead patented and have been drawn five or six holes at speeds ranging from seven hundred to a thousand feet a minute.

★ ★ ★

I would first like to show you the equipment that we are using experimentally for this work.

★ ★ ★

The equipment used for the descaling of rods is shown in Figure 1. The base of this particular machine consists of an eight inch steel angle on which are mounted two grooved rolls—one in the horizontal plane and one in the vertical plane. Before bending around the rolls, the rod passes through two guide dies which, in addition to guiding the rod, also even out the twisting action of the rod induced by the pay-off flipper. Without the two guide dies the rod will



twist locally between the two descaling rolls and, as a result, will leave a short length of rod only partially descaled.

★ ★ ★

The descaling rolls are made of hardened steel and we are using rolls with a three inch groove diameter. The rolls are mounted on a shaft that is supported by two self-aligning flange bearings. After the rod has passed around the second roll, it is guided through an air wiper which blows off any loosely adhering scale and smut. We have also used various other types of wipes made of waste or steel wool.

★ ★ ★

The descaler is enclosed on the top and sides with a steel cover. The scale falls through openings in the horizontal leg of the base into a container.

★ ★ ★

In this brief presentation we might compare the various operations in the drawing of mechanically cleaned rod with those normally encountered when drawing acid cleaned rod.

★ ★ ★

We first found that even before drawing it was necessary to make a change in our welding procedure. This change involved the removal of scale from the rod for a distance of approximately five inches either side of the weld so that good electrical contact could be obtained for the welding and annealing of the weld.

★ ★ ★

After placing the rod on the pay-off stand we soon learned that the uncleaned rod would not flip as readily as acid cleaned material. Several loops of rod would pull off the coil at one time and the snarl switch operated more frequently than desired, causing considerable shut-down time. This problem has been partially solved by minor adjustments to the flipper stand and having the operator take more care in placing the coil on the stand. Some operators sprinkle old powdered soap over the coil in an effort to reduce the friction between the rod strands.

★ ★ ★

A more serious cause for lost production time is due to breaks in the rod when bent around the descaling rolls. Breakage on the descaler rolls is due to defective welds and rod surface defects. Although the number of breaks at this point may not be large, each break means that the entire machine, including the descaler, has to be restrung. This operation requires considerable time and adds to the work load of the operator.

★ ★ ★

The primary problem, however, is in the drawing operation. The lack of a sull, borax or lime coat on the rod creates an additional function for the wire drawing lubricant. The minute peaks and depressions on the surface rod are no longer provided with a protective coating which also functions as a lubricant carrier, creating new problems. For this reason the wire drawing temperatures are higher than those that normally obtain with acid cleaned material.

★ ★ ★

Provided the wire drawing temperatures do not reach a critical stage, satisfactory performance can still be obtained. With high carbon steel we are apparently operating at temperatures which are near the critical point and this results in certain restrictions on operating conditions. We have found that in drawing mechanically descaled rods we cannot operate at the same speeds as can be used satisfactorily on acid cleaned rods, nor can we obtain the same die life.

★ ★ ★

Since the breakdown of the lubrication is primarily a function

of temperature, any change in drafting, speed, or wire drawing equipment that will result in lowering the temperature of the wire will improve the performance of mechanically descaled rods.

★ ★ ★

Improved wire drawing lubricants, or lubricants that will perform satisfactorily at higher temperatures are essential. Developments in this field will advance the art of mechanical descaling of high carbon steels more than any other factor.

★ ★ ★

Outside of the problems of acid disposal, the primary reason for using mechanical descaling is one of economics. However, the saving obtained by eliminating acid cleaning of rods must not be offset by additional costs in the wire drawing operation. Up to this time we have not reached this stage in our development work, but we feel that we have made certain advances and will continue our efforts in this direction. (Applause)

★ ★ ★

Chairman Miller: Our next speaker will be **George Fecson,** Die Room Foreman, **Pittsburgh Steel Co.,** Monessen, Pennsylvania.

★ ★ ★

Mr. Fecson: When I was first told about drawing wires without going into the cleaning house, I didn't think it could be done. I visited Laclede Steel Company at Alton, Illinois, to see what they were doing.

★ ★ ★

Our descaler was built with two sets of rolls, one in a horizontal and one in a vertical plane, with the center roll adjustable for crimping and a triple box for limestone.

★ ★ ★

I tried the same practice as Laclede, but it just didn't work. Our wire was breaking and scratching.

★ ★ ★

Then I started to check for faults:

(1) **Our rods were flat gauging 204/222 and 217/237.**

(2) **Double die guide in front of rolls to straighten rod.**

(3) **Change drafting**
With limed rods we draw 119 3 holes from #5 rods.
We changed to 4 holes with 26% reduction, using a larger ripper die to take the pressure off and round out the first hole, which meant we had to add an extra draft.

(4) **Crimping lightly, just enough to crack the scale.**

(5) **Dies: Ripper die angles, R 8 dies, 30° and R 5 dies, 20°, with 60° for tops and backs; other dies 16°, with bearings of 50% and smaller.**

★ ★ ★

The first set of dies I started to use I put in at the start of each turn and took out at the end of the turn to check them for roughness and oversize. This set produced 65,000 lbs. of 4 hole 119 at 800 FPM, after which they started to get rough with pressure rings and the finish die showing oversize wear.

★ ★ ★

By drawing through a triple box filled with limestone to take off fine scale dust, after a few weeks I had to discard the lime box and just wrap old waste around rod with a band wire.

★ ★ ★

Flipping rods into the machine, there would be several rings come off at a time, and we had shut the machine off. We raised the flipper arm higher and found that helpful.

★ ★ ★

Chairman Miller: Thank you, George.

★ ★ ★

Our next speaker will be **C. F. Wickwire,** Vice President of **Wickwire Brothers, Inc.,** Cortland, New York.

★ ★ ★

Mr. Wickwire: Mr. Chairman and members of The Wire Association, I want to start this discussion of the scale breaking wire-cleaning process from the standpoint of the company that is starting to build a new wire mill from scratch, and to discuss the pros and cons of the machine in comparison with the conventional acid pickling methods in general use. In other words, how much would a mill dare depend on this method in commercial production, how much money and what capacity should be invested in a pickle house and how many scale breaking devices should be purchased.

★ ★ ★

Our company is quite old and we have approached this problem very slowly. However, we have had experience with scale breaking over a two-year period and have discovered some of the advantages and disadvantages.

★ ★ ★

Our mill processes low carbon wire exclusively. I can list some of the advantages that are in many cases obvious.

★ ★ ★

First, there is a definite saving in cost of the wire produced, as the entire cost of the cleaning operation is virtually eliminated. Some people have advanced to me the peculiar notion that cleaning costs are increased due to the fact that what wire remains to be pickled costs more to clean. This is due to the small traffic through the cleaning line, no decrease in capital investment in an old mill and so forth.

★ ★ ★

The fact still remains that the over-all cleaning costs for a given tonnage should be less.

★ ★ ★

Next, there is the ever-present tightening up of laws regarding the disposal of pickle wastes. This machine, if used even for part of the production, substantially reduces the amount of liquid wastes that must be disposed of and ameliorates this problem to some extent.

★ ★ ★

The machine produces scale as a by-product, which is of high quality and can be sold, or used to good advantage in completely integrated mills. In general, the scale is a nuisance, but amounts to one-half or one per cent of the weight of rods put through and has some value in most cases.

★ ★ ★

You can list as an advantage that the power consumed by the scaling operation is negligible. To

prove this to my own satisfaction, I have run a limed rod straight into the machine, and the same rod then through the scaler into the machine. One test was on 17 carbon steel run from No. 5 rod to ten gauge at eight hundred feet per minute on a three block Morgan Connor machine. The power consumption in both cases was approximately 39 amperes per phase of the three wire 440 volt system.

★ ★ ★

Of course, there is no loss of metal due to dissolving in the pickling solution and waste from this cause is eliminated.

★ ★ ★

Wire drawn by this method galvanizes better than wire cleaned by conventional pickling and drawn. This may be due partly to a better tooth on the surface and partly to the elimination of excess lubrication which must be burned off before the zinc bonds to the metal.

★ ★ ★

It is very obvious that there is not as much lubricant carried into the die as with limed or otherwise coated rods, and so not as much lubricant is consumed.

★ ★ ★

So much for some of the advantages. The main disadvantage encountered in the exclusive use of the scaler is the limitations of the finish you are able to produce. There is no question of varying cleaning practice to produce different finishes for different requirements. This eliminates the use of the machine for a great many kinds of wire, particularly wire for sale as such. There are also requirements in the mill that preclude the use of this machine. A great deal of work can be done in producing lubricants, which, if they haven't eye appeal and customer acceptance, at least can meet the requirements of the use to which the finished wire is to be put.

★ ★ ★

Another great disadvantage of the operation of the machine is the scale produced which is very disagreeable, abrasive, and dirty. Scale covers the floor, gets into electrical equipment, bearings, and so forth and is a nuisance. All motors should be protected, as well as auxiliary electrical equipment. Flippers, guides, and stops are liable to excessive wear and cutting. Disposing of the scale is not much of a problem as disposing of acid, but it is nevertheless a problem.

★ ★ ★

We have found that in order to work properly, wire rods must be dry and free from excessive red rust. If we have stock that for some reason is rusty, we find that it saves trouble in the long run to pickle it.

★ ★ ★

Due to the fact that such a thin lubricant is carried into the dies, in most cases you must be sure that adequate cooling both of dies, blocks and wire is provided. The film of lubricant is not tough enough to stand up as well as a lime and soap lubrication. We believe that there is slightly more wear on blocks and capstans in the machine.

★ ★ ★

There is some change in the physical properties of wire produced, but in general for low carbon work, these can be disregarded. In high carbon work, they can no doubt be compensated for by varying the grade of steel or practice somewhat. Of course, all danger of acid brittleness is eliminated.

★ ★ ★

Another difficulty is that butt welding of the coil before drawing is made somewhat more difficult by the scaly rod, but this can probably be overcome by a special type of jaw that will penetrate the scale or by increasing the voltage of the welding machine.

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On coarse wire, particularly big sizes, a butt welded process is also required, for it is too difficult to restring the machine, and the scrap involved would be too great if the bundles were not welded and run continuously. The widely used practice of pointing each bundle on this type of work has to be abandoned.

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So much for some of the disadvantages of this process. In addition I would like to make a few general statements about the process.

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The first and most amazing one to me is that it works at all. I remember trying at one time to see what a scaly rod would do if drawn into a carbide die in the conventional way. You can imagine the results which were horrible indeed.

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We have drawn wire experimentally as many as ten holes to .035" with good results, the only difficulty being that the wire did not climb the blocks as well as better lubricated material.

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Die life is approximately the same as with conventional cleaning, although if a die fails, particularly with slightly rusty rods, it is generally damaged more than with conventional cleaning and lubrication.

★ ★ ★

We have found that running the wire through boxes containing lime, scale stones, or other junk is not helpful and that a blast of clean, dry air properly applied is better than any of these things after the scale is broken to remove the fine dust. The Gorcy Line type brushes are very effective in removing residual scale dust.

★ ★ ★

Lubricants, as I have mentioned, have a great deal to do with the success of this type of operation and a great deal of work can be done along this line. In general, a lime base lubricant is essential with the proper richness and melting point for the type of wire drawn and also designed to operate best for the type of machine used, especially properly made for the heat encountered in the drawing which is affected by the type of wire drawn, the speed of the machine and the type of cooling.

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As to types of descalers available, I do not believe that there are any of American make avail-

able. The Gorcy and a German machine are presently available and being manufactured. I believe some mills have attempted to make their own. In any case, care should be used to secure a machine that is rugged enough and of such heavy construction as to stand up under severe mill usage.

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In closing, this method, I believe, is a valuable supplement to a mill's facilities, but cannot be depended upon in all circumstances. It wouldn't be prudent to depend exclusively on such a process, except under particular conditions and after taking certain precautions.

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Chairman Miller: Thank you, Chet.

★ ★ ★

Our next speaker will be **Arthur Hedman,** Die Room Foreman, **Wickwire Spencer Steel Division, Colorado Fuel & Iron Corporation,** Palmer, Massachusetts.

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Mr. Hedman: Mr. Chairman and members of The Wire Association, as far as we are concerned at Palmer, we are sitting on top of the world, at least according to the previous speakers on the subject.

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It is a peculiar thing sometimes but you know, I am sure that sometime ago Roebling became a member of the Colorado Fuel and Iron family. We had not made any attempt whatever to mechanically scale our rods until some of our boys paid a visit to Trenton, New Jersey, and came home with a picture. (See Fig. 1, page 502)

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That rigging on the further end, if you will notice, we do not use that. Otherwise our descaler is exactly the same design with the exception that one of the guides has been eliminated. We use only one.

★ ★ ★

I am happy to report that we are having some very nice runs with this rig. At the present time we have seven of them in operation, with nine more under construction and there is also some talk going on now about throwing out some of our cleaning equipment.

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We use this descaler on both high and low carbon and as far as die life is concerned, it hasn't changed much from our previous process.

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There are a few things that have to be looked after, such as lubrication. I haven't gone into this to any extent, but I understand that there is a gentleman on the panel this morning who is going to give us some information along that line. However, I am sure that without lubricants we would not have gotten very far with this process.

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We do get some very nice die life using this equipment.

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The average on our high carbon, running at speeds of approximately one thousand feet per minute is nine to twelve tons per die.

★ ★ ★

On our low carbon, running at about 1500 FPM, it is from fourteen to sixteen tons per die, which we consider very good.

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There is no question in our mind as to the economy of the thing.

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Our cleaning costs previously had been rather high.

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We are certainly going into this thing more extensively, as we believe that it is here to stay.

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Chairman Miller: Thank you, Arthur.

★ ★ ★

Our next speaker certainly has had several challenges thrown at him and I hope that he has the answers.

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We will now listen to **Walter A. Smigel,** General Manager, **R. H. Miller Company,** Homer, New York. Mr. Smigel.

★ ★ ★

Mr. Smigel: Mr. Chairman and Gentlemen, all of the manufacturers of wire-drawing lubricants have actively cooperated with the wire-drawing industry in the development and advancement of descaling.

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During the past three years, we have spent considerable time with about fifty companies either using descaling or investigating the feasibility of adopting descaling for their particular plants.

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Although a few plants have not found the descaling method entirely suitable for their needs, these plants, as a result of their experience, should have a better background to reconsider descaling if another acid shortage should occur, or if sometime in the future water pollution statutes should prevent them from using chemical cleaning methods.

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Whereas descaling has had periods of great activity and interest followed by some periods of comparative inactivity, it can now be said that descaling has progressed to the stage where most wire plants are of the opinion that descaling is a valuable tool.

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It has been proven that many types of wire can be successfully drawn from descaled rod and wire by the use of the proper lubricants.

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A logical approach to the discussion of lubricants for drawing mechanically descaled rod and wire would be to summarize wire-drawing lubrication practices as they are conventionally carried out with acid cleaning and with a coating such as lime and then compare them with the methods thus far developed for the descaling process.

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In wire drawing there are three common methods of lubrication.

They are dry drawing, wet drawing and grease drawing. All three employ chemical cleaning of the rod or wire and coating with a carrier, such as lime, borax, phosphate coatings and so forth, and, in some cases, a sull coating or metallic coating such as copper, tin and so forth.

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In the first method of lubrication, when the rod or wire passes through the powdered lubricant in the die box, a small amount of soap adheres to the surface and is carried into the die. The heat and pressure of the drawing operation transform the lubricant and carrier into a plastic film, which serves to reduce friction and minimize metal-to-metal contact, thereby preventing scratching and maintaining good die life.

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In order to better understand the action of dry wire drawing powders, it may be well to discuss the terms "richness" and "leanness" of powdered lubricants.

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For purely illustrative purposes, consider two extremes—fatty oil and lime. The fatty oil with a low melting point would form a thin film under the usual wire-drawing conditions and would offer little resistance to metal-to-metal contact.

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On the other hand, lime, with an extremely high melting point, would act as a good separator, but it would retain its abrasive characteristics under the most severe wire-drawing conditions. Together these two products, namely lime and fatty oil, could be combined under the proper reaction conditions, to form a solid lubricant which would be plastic over a wide range of temperatures and which would not have a sharp transition point from the solid phase to the fluid phase.

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As the lubricant is made richer, it will reduce drawing friction by providing more slip, but, simultaneously, its separating power will be decreased. Conversely, if the lubricant is made leaner, its separating power is improved at the expense of reduced slip.

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The "richness" of a wire-drawing powder is affected by the type and amount of fat used, by the composition and percentages of high melting point chemicals and by the method of processing. In the manufacture, if the high melting point chemical—usually alkalies—are homogenized into a solid solution with the balance of the lubricant, the finished product will have the ability to withstand greater temperatures and pressures.

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Lime may be mechanically added to a dry powder to obtain a higher-melting point or "leaner" working powder. However, for wide variations in lubricant composition, a mechanical mixture will not give the same operating results as a homogeneous compound of the same chemical composition.

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Petroleum greases are sometimes mixed with considerable amounts of lime to form a powder and this should, it is believed, be included under the classification of dry drawing.

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In this case, the lime does not go into solid solution as explained, but rather into a mixture.

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Finishes, such as for welding wire and welded fabric, may be obtained with a light lime coating and this type of lubricant. With heavy lime coatings, suitable nail finishes may be produced, although more frequently special metallic soaps are used for drawing nail wire.

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Now to proceed to the subject of dry drawing of descaled rod and wire. The combination of the lubricant with the carrier increases the melting point of the plastic coating formed on the wire. With the absence of a carrier in descaling, except for the small amount of oxide left on the surface, it would seem that a higher melting point or "leaner" lubricant should be used. Generally, this has been found to be true; however, pickup and coverage at the ripper die may not be sufficient if the lubricant is too lean and does not melt readily.

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Nail wire requires a special finish that is not tacky and one which promotes good nail-cutting properties and good tool life on the nail machines. Whereas this type of finish has been one of the most difficult to develop for descaling practice, several types of satisfactory dry lubricants have been devised for nail wire.

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For process wire, such as for heat treating and for galvanizing, the compounded metallic soaps have proven excellent, particularly those with chemical additives. These chemical additives, including sulphur and chlorine compounds, act as extreme pressure agents and are probably more effective when used for descaled rod and wire which has an unprotected surface. Consideration, however, must be given to the corrosion properties and other possible detrimental characteristics of some of these highly reactive addition compounds.

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Soda soaps generally have not been satisfactory for drawing descaled rod and wire because of their tendency to fail and cause scratching. However, certain compounded soda soap powders will draw welding wire and welded fabric wire without difficulty.

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Although it is important to have fine particles in the descaling powdered drawing lubricant, a certain percentage of coarse particles is also desirable to promote rolling of the lubricant in the die box and prevent channelling.

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Wet drawing, the second method of lubrication, includes those practices using aqueous soap solutions, emulsions consisting of fats and oils, and non-aqueous fluid lubricants.

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To date, wet drawing lubricants

have not been successful for descaled stock and at this time can be recommended only as a means of brightening up and cleaning the surface of wire previously dry drawn or grease drawn.

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The third method of lubricating, grease drawing, uses petroleum base greases and paste lubricants, including those with a soap base. These lubricants are normally used with light to medium lime coatings on acid cleaned rods and wire to produce special finishes. For instance, the water-type pastes are generally used for producing one and, sometimes two hole extra-bright wire. The petroleum grease type is used occasionally for one hole, but usually for multiple hole work for finishes such as for welding wire, welded fabric, coat-hanger wire and other end uses.

★ ★ ★

In using heavy paste compounds or thick greases on a descaling set-up, some type of agitation must be provided to prevent channelling since the rod or wire approaches the die in a direct line following the descaling operation. A special grease mixture has been used satisfactorily for electric welded fabric wire.

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In concluding it should be stated that the selection of the correct lubricant for descaled rod and wire involves the consideration of many factors; the primary factor being the end use of the wire to be produced; other factors include the metallurgical qualities of the metal being drawn and drawing conditions such as cooling, speed, percentage of reductions and die design.

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Also in closing it can be stated that mechanically descaled rods and wire can be successfully drawn into many types of wire by the use of the proper lubricant.

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Chairman Miller: Thank you, Walter. I believe that you are going to have a lot of questions on that one, so get ready for them.

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I don't think that this panel would have been complete at all if we had overlooked the research division. At this time we will listen to **S. L. Stalson,** Research Project Engineer, **American Steel & Wire Division, United States Steel Corporation,** Cleveland, Ohio.

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Mr. Stalson: Mr. Chairman and Members and Guests: It has been stated repeatedly that there is nothing new about mechanical descaling; that it has been attempted at one time or another and with various devices over a period of thirty years or more. Just last week, I saw a drawing of a descaling unit that had ben found in an old blueprint file. It was dated July, 1893. Since this print predates the sintered carbide die, the idea was probably being considered as a treatment prior to pickling in order to reduce acid consumption. At any rate, it proves that the method was under advisement as long as 60—rather than 30—years ago. Nevertheless, in terms of first-hand experience, it is quite a new field to a great many of us.

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It was just three years ago that management assigned the laboratory the job of examining its possibilities. The reasons for the assignment were undoubtedly the same reasons so many other people in the wire industry were experimenting with the method. Acid was in short supply, waste pickle disposal was presenting a problem; there were potential cost reductions in handling and materials, plus the possibility of a salable by-product.

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A review of our experiences with mechanical descaling during the last three years starts with a device which rather closely resembled a three roll straightener. With three of these units in tandem, and at angles of 120 degrees to each other (See Figure 1.)

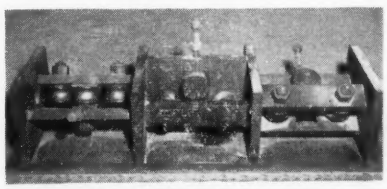

Figure 1 * * * * * * * *

The individual rolls were 2¼" in diameter with concave faces 1½" wide. The first and third rolls of each section were fixed; but the middle roll was adjustable, so that the amount of flexing applied to the rods could be increased or decreased. At low pressure settings, it put torsion twists into the rod. These twists accumulated between the descaler and the die box until they reached a spacing of 3 or 4 twists per foot of length. This twisting greatly magnified even relatively minor surface seams and slivers and resulted in scratching at the ripping die. As we increased the pressure on the center roll, the twisting decreased but the pressure between the roll and the rod became so great that it produced a continuous burnished mark on the descaled rod. The ripping dies soon picked up steel from this burnished line and again scratching resulted. Moreover, the two effects overlapped each other to such an extent that there was no room for an acceptable compromise between them. In analyzing the situation, it was concluded that the twisting was caused by the spacing between rolls and the burnishing was due to the small diameter of the rolls. Since neither of these items could be changed in this model, we decided to build an entirely re-designed unit.

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The new model (See Figure 2) was essentially a 2 roll, 2 plane descaler with 2 guides and 3 auxiliary sheaves for controlling alignment. The distance between the 2 scale breaking sheaves was adjustable so that if twisting occurred, it might be reduced or eliminated with this adjustment. However, twisting was never a serious problem with this unit, and there was no measurable change in drawing performance throughout the range of this adjustment. Therefore, it was decided that in future models, there would be no need for providing a means of varying the distance between the sheaves.

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We also made several sets of sheaves with different pitch diameters. Small sheaves produced too much back tension and the large sheaves did not do a thorough job

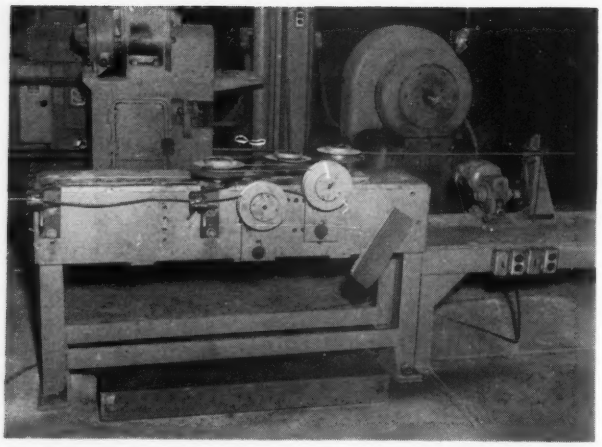

Figure 2

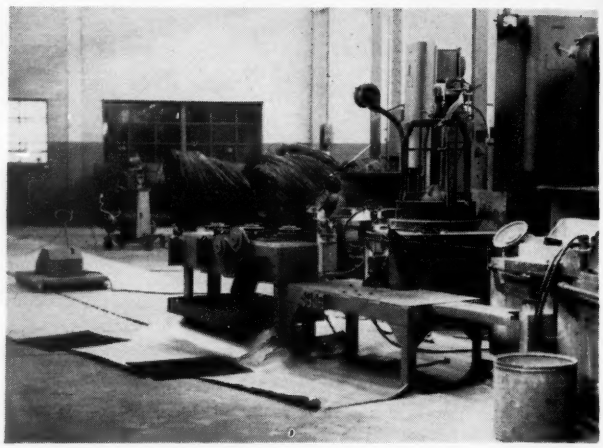

Figure 3

of scale removal. Sheaves of four to six inch diameters gave satisfactory results and are being used on both low and high carbon 5 gauge rods. As yet, we have not attempted to find out how large a rod they will handle.

★ ★ ★

In initial trials with this unit, a series of motor-driven brushes were installed between the descaler and the first die box, to remove any loose flakes of scale still clinging to the rods. Before we had used the brushes very long, we came to several arbitrary conclusions; they complicated the design, and we wanted to maintain simplicity; they increased the initial cost; they might become a source of high R&M; steel and tampico bristles would be subject to wear. Therefore, we substituted a simple tapping assembly.

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Now that we had a unit that was mechanically acceptable, we began to examine some of the other phases of the practice.

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For example, we made a check on the amount of scale being removed from the rods. To do this we cleaned up the working area and covered it with wrapping paper. (See Figure 3). After processing a carefully weighed quantity of trimmed rods, the scale was collected and weighed. The grade of steel was C 1006, and the amount of scale removed came to 1.11%. Later on, we repeated this procedure on a C 1012 grade of steel and obtained a value of 1.44% scale. There are a number of factors that influence the amount of scale on the rods but these values are considered typical of general practices.

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Next we examined the amount of back pull produced by the descaler. To do this, we moved the descaler away from the machine and introduced a load cell between the descaler and the first die box. (See Figure 4).

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The back pull of the descaler amounted to 335#. We were drawing a #5 rod of C 1012 steel to .170″ size in the first die. The .170″ wire had a breaking strength of 1800 pounds and a die pull of 1100 pounds with zero back pull. This made a total block pull of 1435 pounds or approximately 80% of the tensile strength of the wire. Although this seems extremely high, we have never found any reason to believe it is injurious to either the drawing performance or the wire. The extra power required to overcome the 335 pound back pull of the descaler will vary with different drawing speeds. In our particular case, it amounted to 3.2 H.P. when drawing a low car-

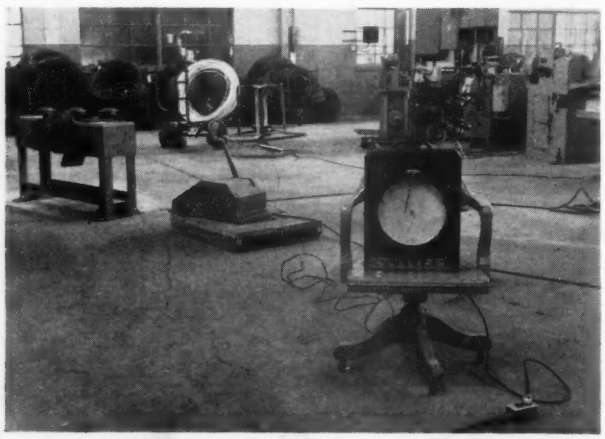

Figure 4

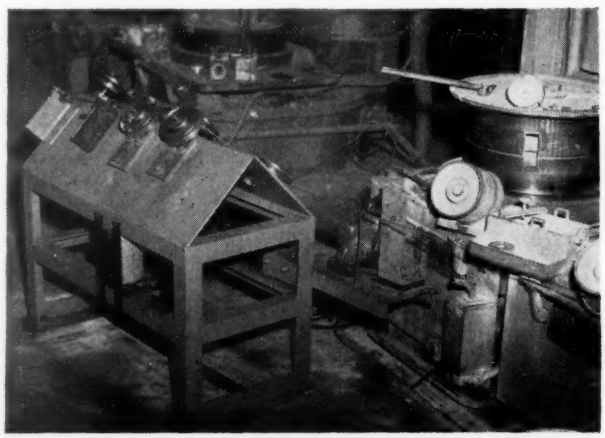

Figure 5

bon 5 rod, 5 holes to 14 at 1500 F.P.M.

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During these and other experiments with this descaling unit, a few mechanical difficulties were encountered. The bearings in the sheaves showed considerable wear. The rods cut grooves in the sheaves, guides, and the scale collected on top of the table and became a nuisance. So a third model was constructed.

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In this model, (See Figure 5) the guides were lined with tungsten carbide. The sheaves were equipped with double row bearings, designed for heavy radial loads, great stability, and long service. Sheaves made of several steels and different treatments, such as nitrided low carbon, hardened high carbon, and alloy steels, had been previously tried and found unsatisfactory. So for this model the sheave grooves were given a hard facing with Haynes Stellite #6 rods. After hard facing, the grooves were machined smooth with a tungsten carbide tool to a thickness of about 1/16" on the sides and 1/8" on the bottom of the groove. The frame of the unit was made with a gable top to dispose of the scale. Each of these changes proved to be a satisfactory solution to the respective problem.

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Now, with a simple, rugged, mechanically sound unit, with laboratory performance records, and some operating experience, we were about ready to move from the pilot plant to a commercial operation in one of the mills. However, there was one more item to be taken into consideration. The size of the unit was unimportant during experimental work in the laboratory, but for mill installations, we would have to substantially reduce the size. The compact unit we wanted was finally achieved by setting the whole descaler in a vertical position.

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This model was equipped with all the features that had been found desirable in previous models —such as T C liner in the entering guide, medium pitch diameter sheaves, Stellite #6 in the grooves and double row bearings.

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These were some of the problems and difficulties encountered in initial stages of our work with descaling. Other problems are now being encountered by the operating personnel in the mills. They are the men confronted with the task of converting a pilot plant method to commercial operations; and are the ones who deserve the credit for the success we are having with mechanical descaling.

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As mentioned by previous speakers, some of the products that are being produced by this method are low carbon wire for nails, staples, galvanizing, field fence, barb wire, welded fabric, and process annealing—plus some high carbon rope wire.

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In closing I would like to leave this thought with you, continuous processes always produce better uniformity than batch processes, but are invariably more expensive. Mechanical descaling, however, not only provides the uniformity of a continuous process but actually saves money at the same time.

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Now, last but not least, we have a different type of descaling operation to be described to us.

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I now present **Allyn E. Harper,** Chief Engineer, **Oliver Iron and Steel Company,** Pittsburgh, Pennsylvania, who will describe the method they have in use at the present time.

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Mr. Harper: Mr. Chairman and Gentlemen of The Wire Association: Our problem is somewhat different from yours in that we are forced not only to descale a rod, but to descale a rod that we make in one of our own divisions.

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The name of Oliver Iron and Steel Company does not mean that we are steel producers. At one time we were, but since 1920 we have eliminated our rod mills and our brass furnaces and are primarily concerned with the production of bolts, nuts, rivets and polished hardware.

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We feel that we are a victim of circumstance in one respect. However, I think that you gentlemen will also be faced with that same problem.

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The Sanitary Water Board of the Commonwealth of Pennsylvania, under the provision of Act 394, approved June 20, 1937 and amended Act 175, approved May 8, 1945, ordered The Oliver Iron & Steel Company, along with other steel producers, to eliminate and to establish measures to reduce the quantity of industrial waste being discharged into the river.

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This law requires us to eliminate all sulphuric acid waste with the exception of three parts per million and we are not allowed to discharge into the sewer and river any more than thirty parts per million of sanitary waste. We are not allowed to discharge any cyanide whatsoever. That act provided a fine and an imprisonment penalty.

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You can see that we have sanitary waste; waste containing oil, sulphuric acid, pickled wastes and waste from our plating department and thus we have quite a problem.

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In 1946 our corporation employed a firm of consulting engineers to investigate the character of our volume and also determine a method of disposing of this waste.

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In 1948 we submitted this to the state and this was the deadline of our initial report. I might add that since then we have been working continuously with the state and also have made a number of studies to eliminate our industrial waste.

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As a result of this we must find, in many cases, alternate methods of cleaning our rod. I might say too

that we produce products that are from ¼" on up and that we do not have a large rod mill. We clean about 120 tons of rod per day and some of this is drawn in the Wire Drawing Department. Some of this is drawn prior to being cold-headed.

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In our sanitary waste we have fifty-three thousand gallons per day discharged and we pay a fee for every gallon of waste that we discharge.

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The method suggested by our firm of consulting engineers represented a large investment of money —much larger than we felt that we were in a position to pay because of the small amount of tonnage that we would be required to charge this operating cost against. As a result of that we were hunting for alternate methods.

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We naturally also investigated by-products recovery and we also looked into contracting for the purpose of hauling away our waste. I am talking about our acid waste. We thought we might give that responsibility to another firm who might have sufficient volume to justify this.

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In contracting we found that we would have to spend $13,500 for storage tanks and that we would have an annual charge of $18,226 just to contract for the removal of this waste. That was only on a five-year contract; since then the contract rates have been increased. They have been subject to renewal at the end of a year. Therefore we felt that the figure of $18,000 would be considerably more in a period of a short time.

★ ★ ★

Our waste being only 3600 gallons of sulphuric acid to be dumped into the river per day, plus 46,700 gallons of rinse water that contains more than three parts per million, it was economically impossible for Oliver to build their own plant to dispose of this waste.

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Our present cost of pickling is $1.44—which includes the steam, water and most of the lime.

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The cost of our acid and the labor cost, and we add to that the cost of neutralization and the cost of hauling away, is an additional fifty-five cents per thousand pounds of steel, bringing the cost up to $1.90 per thousand pounds, an expense with which we are now faced if we continue on our contract method.

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Therefore, we are now hunting for alternate methods of descaling.

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We have tried several different processes and we have done some work, as you gentlemen have, and we find that in many cases that some of these methods really have some major objections—since they require a further acid wash after the initial scale removing. There were two that we thought might be of benefit to us; these were the shaping and the twisting methods. We have done a considerable amount of experimenting with those as far back as 1921.

★ ★ ★

We looked into the "wheelabrator" method and at first we questioned it. We sent out several coils and had them shot-peened. When they came back the staff gave them a very careful going over. We headed a few products and it appeared that everything seemed to be progressing in the right direction. Therefore, we sent out a large amount of wire and had the same thing done to it. Then we brought the wire back and we made our hardness test, with which we were also concerned, and we found that by bending and testing and twisting the wire, we could work up a hardness that would allow us to make certain types of heads.

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Our wire came back and it was absolutely clean and free of scale and because of its surface texture, the wire was put through our wire-drawing operation and we are now experiencing from fifteen to twenty per cent increase in die life, not only in our wire-drawing dies but in our heading dies.

★ ★ ★

Our actual investment in this case will only be $79,000 and our cost per thousand pounds of steel will be $1.61 per thousand pounds. Now we are cleaning both high and low carbon wire.

Chairman Miller: Thank you.

Now you have met the panel members and you must have some idea of some of the things that they have done and are doing. I am sure that you must have some idea, also, of some of the problems that they have faced. Perhaps some of them can give you answers to your questions.

Discussion Following the Symposium—
"The Progress of Mechanical Descaling of Rods for Wire Drawing"

Chairman Miller: We have some written questions here but we are going to save them until a little later. I will now call for questions from the floor.

A Member: My question is directed to Mr. Godfrey. I am wondering about those critical temperatures—what those critical temperatures would be.

Mr. Godfrey: I really do not know what the temperatures are. They are, I believe, pretty high. Normally we get a charge of soap coming out of the die when we are running satisfactorily. When we start to get into trouble is when we see the actual burning of these soaps. As soon as you get that condition then you start to get scratching and your dies have gone. Just what the critical temperature is I don't know. I think it is something that goes up very fast. If you do not have the proper lubrication then you should go way up on temperature quite rapidly.

I think that one of the important things of this study is not the temperature or melting point, but it is the adhesion of the soap to the material. That is the characteristic that seems to be missing—at least on high carbon. If you

(Please turn to page 571)

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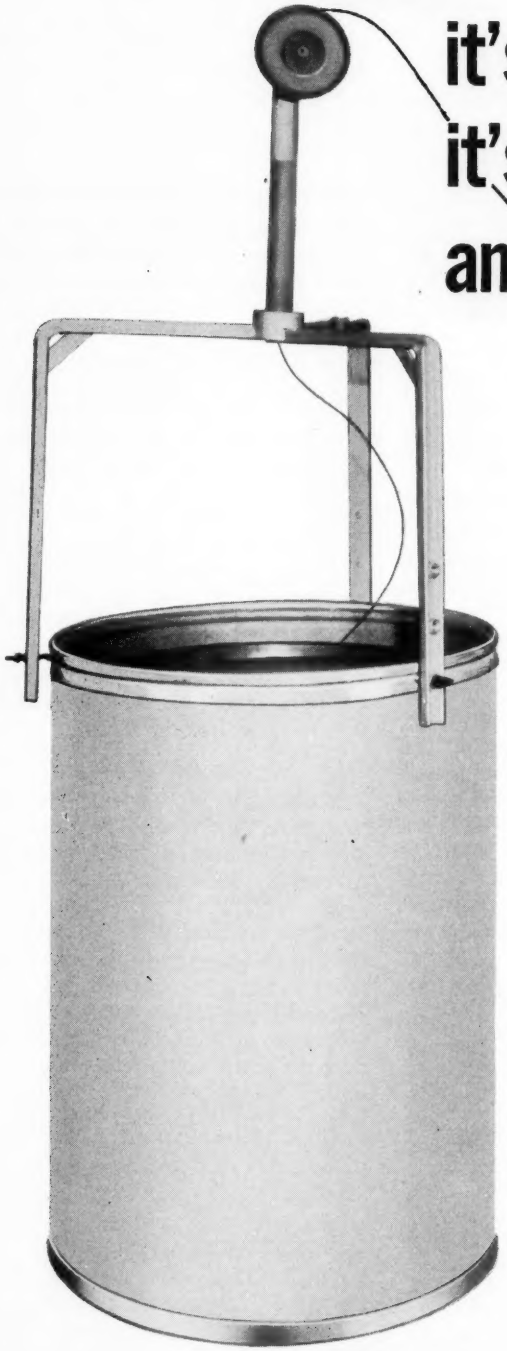

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Rural Distribution Wire

by Clement C. Lawson, Wire Development Engineer
Bell Telephone Laboratories
Murray Hill, New Jersey

In this paper, the author describes a wire designed about two years ago to meet the need for a low cost, multipair facility for reinforcing or extending open wire and cable circuits, particularly in rural areas. It is comprised of a support wire of high strength galvanized steel with six twisted pairs of plastic insulated copper conductors twisted about the support wire. Design features, installation methods and the strong and weak points of the wire are discussed. The paper was delivered at the annual Convention of The Wire Association in Chicago on November 10, 1953.

Supplying telephone service to customers in rural areas presents problems quite different from those encountered in urban and suburban areas. The low population density means that long distances must be traversed with a single circuit or a small group of circuits. Many locations will be quite far from a central office. Under these circumstances, the design of distribution facilities for service at low installed cost has been, and remains, a real challenge to the Bell System. The problem is further complicated currently by the increasing demand by rural customers for a higher grade of service, such as two-party or individual lines instead of the multi-party lines usually used in rural plant.

★ ★ ★

Many facilities for providing service in rural areas have been devised, and each finds a field of use under the specific circumstances favorable to its adoption. These include open wire lines, small cables, buried wires, and carrier circuits on power distribution lines. More recently, a multi-pair rural distribution wire has been developed.

★ ★ ★

This wire consists of six twisted pairs of insulated copper conductors cabled around an insulated steel wire strong enough to support the structure in the spans normally encountered (up to 250 feet in heavy storm loading areas). The conductors are No. 19 AWG (.036 inch diameter) annealed copper. Each conductor is insulated with polyethylene followed by an extruded outer covering of semi-rigid or rigid polyvinyl chloride compound to provide added toughness. This outer covering protects the polyethylene insulation from injury during installation and service. The conductors, thus insulated, are twisted into pairs, each having a different twist length to reduce crosstalk between them. The pairs are cabled around the support wire with a lay of approximately nine inches and in a direction opposite to the pair twist. This lay is sufficiently long to facilitate spreading of the pairs for making attachments to the support wire. The construction is shown in Figure 1.

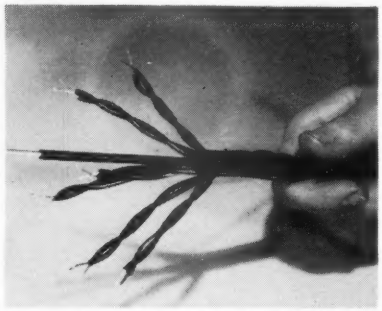

Figure 1—Construction of Rural Distribution Wire showing 6-pairs cabled around support wire.

The support wire is .109 inch diameter galvanized steel having a tensile strength of approximately 210,000 p.s.i., resulting in a breaking strength of a little over 1800 pounds. It is insulated with polyethylene which acts as a mechanical cushion and provides adequate electrical breakdown strength between the conductor insulation and the steel wire. This steel support wire is chosen primarily for its high tensile strength. It is quite similar to the galvanized steel core wire for steel-reinforced stranded aluminum cable as covered by ASTM Specification B-245 except that it is ordinarily purchased to electrical resistivity requirements as well as the usual mechanical requirements. It is a wire used as open wire conductor when spans up to 600 feet may be encountered and is thus stronger than the high strength steel line wire covered by ASTM Specification A-326.

★ ★ ★

Manufacture of rural distribution wire involves no new materials, and it is adapted to the usual extrusion, twisting, and cabling machinery. The polyethylene insulating compound is the same as that used for sheathing cables and is specially compounded for long life outdoors. The polyvinyl chloride outer, or secondary, insulation is a selected compound that will not affect the electrical characteristics of the primary polyethylene insulation. It is similarly compounded for long physical life under the exposure conditions to which this wire will be subjected in use. This outer jacket is extruded to fit snugly over the polyethylene. The wire is furnished in factory lengths of approximately three-fourths of a mile on reels from which it can be payed out directly.

★ ★ ★

This new wire incorporates some

of the features of open wire and some of cable. Its attenuation when dry is intermediate between the usual low- and high-capacitance sheathed cables, but since this wire has no outer sheath, the attenuation increases in wet weather to a somewhat higher level than that of either type of cable. Like cable, it may be loaded when used in long runs. It is more like open wire, however, in its susceptibility to noise pickup and in the need for protection of associated lines and equipment from damage by lightning and by accidental contact with high voltage power circuits. Protective equipment similar to that used on open wire lines is therefore required.

★ ★ ★

In the short time that rural distribution wire has been available, it has found use in a variety of ways. It is particularly useful in adding circuits to existing open wire lines which already are so heavily loaded that they could not carry another crossarm of open wire without being extensively rebuilt. Use of the new wire under these conditions is illustrated in Figure 2, where it has been strung below the open wires.

★ ★ ★

The wire may also be used parallel to runs of small distribution cable where it is desired to provide additional circuits from a main cable for distribution on open wire line extending beyond the end of the existing cable route. This usage is illustrated in Figure 3, where the distribution wire is strung above a small cable. Finally, the wire can be used as branches off existing main lines of open wire and cable. Here, several circuits may be distributed to care for a few customers where the chances of further demands for service appear slight.

★ ★ ★

Rural distribution wire is designed for rapid and inexpensive installation. A simple type of supporting bracket, in the form of a "J" (Figure 4) fabricated from half oval steel stock, provides a saddle (the loop of the "J") over which the wire can be pulled during payout and to which the support wire may be attached after the line has been tensioned. For

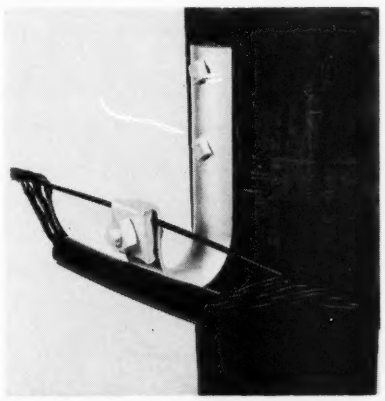

Figure 4—Pole mounted support for Rural Distribution Wire.

pole mounting, the long leg of the "J" is provided with two holes to accommodate either two lag screws, or one lag screw and a through bolt, to secure the hook to the pole. The short leg of the "J" has a single square hole to accommodate a short carriage bolt, on which is fastened half of a standard one-bolt clamp. All of these hardware items are galvanized.

★ ★ ★

Another type of bracket, similar in design, is provided for use where the bracket must be attached to a crossarm instead of to a pole. This arrangement is shown in Figure 5. In this bracket, the long leg of the "J" is made longer than in the bracket for pole mounting, and contains a twist which serves to properly orient the hook portion below the crossarm. In attaching the crossarm type bracket, the long leg of the "J" is placed against the side of the crossarm, with the end extending somewhat above the arm. The bracket is fastened in place with a "U" bolt, which spans the arm. This method of fastening avoids having to drill the crossarm and prevents rotation of the

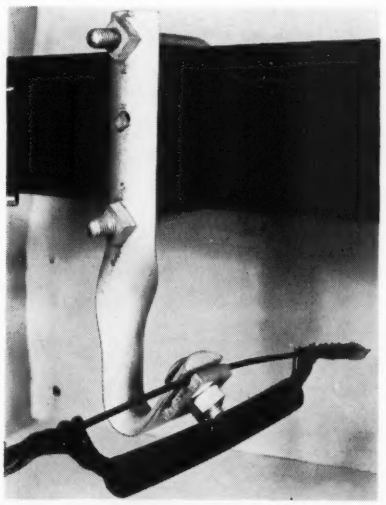

Figure 5—Crossarm mounted support for Rural Distribution Wire.

bracket. A lag screw, driven into the side of the crossarm through a

(Please turn to page 569)

Figure 2—Installation of Rural Distribution Wire where crossarms above are carrying open wire lines to capacity.

Figure 3—Rural Distribution Wire supplementing small ring-supported distribution cable.

THE WEST COAST REGIONAL MEETING

of

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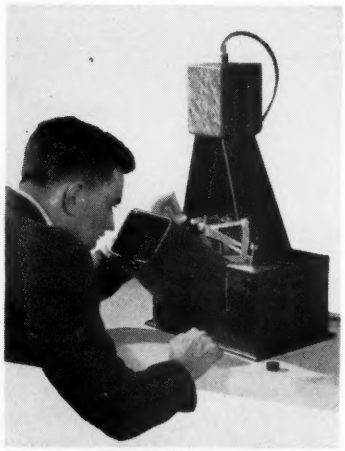
Die Measurement and Inspection

by J. G. Wistreich, M.Sc., D.I.C., A.M.I. Mech. Eng.
Head of Metal Working Laboratory
Bristol Iron and Steel Research Association
London, England

This new instrument for measuring die angles, although developed by the Association, is being manufactured in England. There are now a number of such instruments on the market, both of domestic and foreign manufacture, the use of which should facilitate servicing operations in the die rooms of wire mills and the delivery of more accurately made new dies by the producers of these important wire drawing tools.

A new British instrument to provide a robust, simple and cheap optical die inspection tool for measuring die angles and inspecting bore condition. Made specially for die shops where semi-skilled and unskilled labor is used, the "Profiloscope" accepts a lower degree of precision ($\pm\frac{1}{2}°$ die angle instead of 0.1°) than existing instruments in order to achieve its aim of sturdiness and ease of operation.



The Profiloscope.

The instrument is based on a very simple principle in which a narrowly divergent light beam passes through the die placed on a tilting table, on to a screen placed below. When the die is horizontal a small bright circle of light is seen, outside which is a first dark band, and then a narrow band of light, all these being concentric. The innermost circle is due to direct illumination through the die hole and the outer to internal reflection from the tapered region of the die. Any changes in taper show up as additional concentric light circles, one for each change in taper, while a gradual change in taper causes a wider band of light. Scoring shows as light radial lines radiating from the centre circle. The effect may be intensified by tilting the die. Inspection of the die interior is therefore very simple.

★ ★ ★

To measure the die angle, the die is tilted, when the outermost circle of light distorts to a heart-shaped image; by sufficient tilting, the cusp or peak at the top of the heart may be made to touch the innermost circle. The operator now uses a scale adjusting screw to move the angle scale until the die diameter appears against the pointer. He then tilts the die in the opposite direction until the cusp touches the centre spot on the opposite side. He can now read off the total die angle against the pointer. Measurement of die angle takes about twenty to thirty seconds.

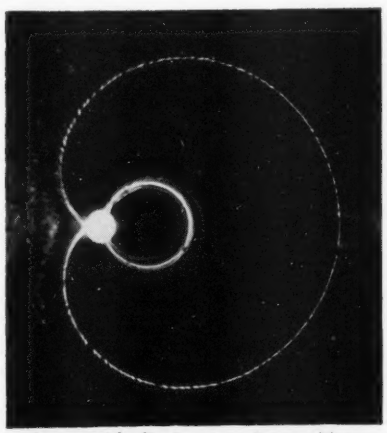


Image with die in measuring position.

Batch quality control of die profile is even simpler. If tolerance limit markers are placed on the instrument scale the die angle can be checked without the need for exact measurement and standard images can serve as criterion of surface finish. It has been found in the United Kingdom that between five and ten per cent machine working time is lost by replacement of worn tungsten carbide dies. In one works investigated this was estimated to cause a loss of output of 1,000 to 2,000 tons per year, worth some 35,000 to 40,000 pounds. Quality control of this sort should enable wire drawing works to plan batch replacements economically, reducing this expenditure considerably.

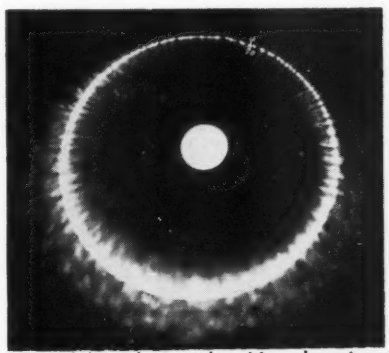


Image of die in horizontal position; shows taper partially removed and scoring beginning.

The problem of die angle measurement illustrates a dilemma of instrument design. It is whether to aim at a limited amount of information of high precision or at more comprehensive information of a lower order of precision. In practice the choice between these alternatives depends on the purpose which the instrument is to serve. Generally speaking, the design of an instrument is efficient

(*Please turn to page* 570)

Silicone Rubber As Cable Insulation

by J. F. Dexter and P. C. Servais
Dow Corning Corporation
Midland, Michigan

This paper was presented at the Signal Corps Wire and Cable Symposium in Asbury Park, New Jersey, on December 14, 1953, and is published here through the courtesy of the authors and their company. The paper was delivered by Mr. Dexter.

The first shipments of silicone rubber to cable manufacturers were made in 1945. These early silicone rubbers were characterized by unusual thermal stability, fair electrical properties over a wide temperature range, and resistance to corona and weathering. Their usefulness as cable insulation was limited, however, by relatively poor physical strength and fabrication difficulties. During 1946 only a few hundred pounds per month of silicone rubber were used for wire and cable insulation.

★ ★ ★

In spite of their physical limitations, some uses and many potential applications were found for silicone rubber insulated cable. Interest stimulated by the inherent stability of these rubbery insulating materials resulted in progressive improvement in their physical and dielectric properties and in their handling characteristics. During the past seven years, radical improvements have been made in the polymerization, compounding, and vulcanization of silicone rubber. As a result, the consumption of silicone rubber as cable insulation has increased to tens of thousands of pounds a month.

★ ★ ★

Early in the development of silicone rubbers it was recognized that the polymer determined the inherent stability of the rubber, while fillers determined to a great extent the physical and electrical properties of the vulcanized and cured rubber. The properties of silicone rubbers can therefore vary over a wide range. Considerable research was necessary to obtain the best combination of properties. The properties of the silicone rubbers that are dependent primarily upon the silicone polymer are:

Low temperature flexibility
Thermal stability
Oil and solvent resistance
Corona, ozone and weather resistance
Non-adhesiveness to organic materials

★ ★ ★

These properties can be modified to a certain extent by changes in the polymer. Incorporation of a small amount of phenyl as a side group into the otherwise standard dimethyl polysiloxane polymer will extend the low temperature operating range of a silicone rubber from -55 to -90 C. Changes in the polymer size determine to a great extent the consistency of the silicone rubber stock. A silicone polymer with low molecular weight will make a paste suitable for knife coating onto fabric or for caulking voids in electrical equipment. Higher consistency rubber stocks can be made from higher molecular weight polymers. These rubber stocks are suitable for molding, extruding and calendering. Improvement in these polymers has resulted in stocks that can be handled by conventional wire covering techniques. Silicone rubber stocks are now easy to mill. They can be extruded uniformly and vulcanized in continuous vulcanizers. Adhesion or release from the wire can be controlled by treating the wire.

★ ★ ★

The properties that are dependent upon the type and amount of fillers compounded into the polymer are:

Color
Specific gravity
Elongation
Tensile strength
Durometer
Tear strength
Dielectric properties
Compression set
Expansion coefficient
Moisture resistance
Chemical resistance
Thermal conductivity

★ ★ ★

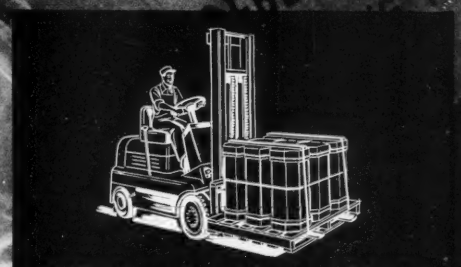
Many hundreds of fillers and combinations of fillers have been investigated. Only a few of these have proved useful and they have been incorporated in the commercial compounds. The filler used in the first commercial compounds was titanium dioxide. These rubbers had fair physical and electrical properties but their electrical properties were adversely affected by moisture.

★ ★ ★

Because they are less affected by water, silicon dioxide fillers were next to receive attention. Silicone rubbers compounded with silica in the form of diatomaceous earth have been used in large quantities. These rubbers are characterized by excellent handling properties, fair physical and good electrical properties. In general, they can be extruded in conventional rubber extruders at rates comparable to those obtained with organic rubbers. The electrical properties are satisfactory and they are less affected by moisture than the titanium dioxide filled stocks.

★ ★ ★

Several years ago, the first major improvement in the toughness and physical strength of silicone rubbers was achieved when stocks containing silicas of the aerogel type were developed. These stocks have good physical and electrical properties. However, fillers of this type contain inorganic salts, and stocks compounded with them have



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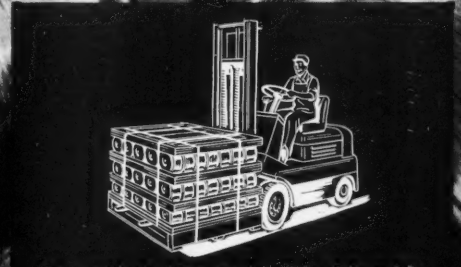

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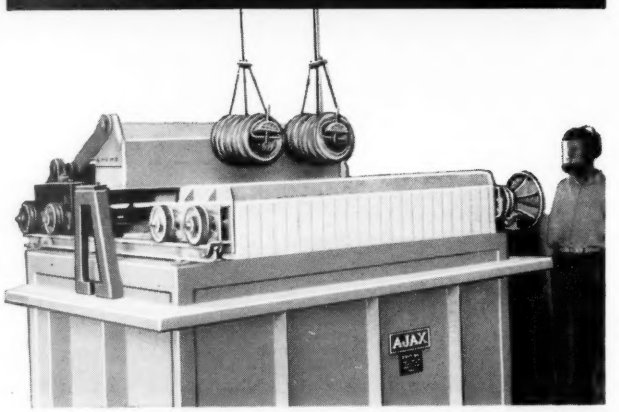

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high water absorption. At elevated temperatures the effects of water are accelerated. Both the physical and electrical properties of these stocks deteriorate rapidly when the rubber is subjected to hot, moist conditions or immersed in water. A water absorption value of 20% after immersion in boiling water for 70 hours is not unusual for stocks of this type. This fact seriously limits the usefulness of these stocks for wire and cable insulation.

★ ★ ★

The physical and electrical properties of typical commercial silicone rubbers compounded with titanium dioxide and with silicon dioxide of the diatomaceous earth and aerogel types are given in Table I.

Table I

Typical Properties of Earlier Silicone Rubbers

	Silastic 167	Silastic 181	Silastic 250
Filler	Titanium Dioxide	Diatomaceous Earth	Aerogel
Tensile Strength[1], psi	550	755	675
Elongation, %	85	65	290
Durometer, Shore A	75	85	45
Tear Strength, lbs./in.	55	38	70
Compression Set @ 150 C.	50	70	60
Dielectric Strength[2], V/M	350	400	400
Dielectric Constant 100 cps.	9.6	3.6	3.4
Power Factor 100 cps.	0.007	0.018	0.004
Water Absorption, %			
7 days @ room temperature	1.3	1.1	6.5
70 hours @ 100 C.	--	--	20.0

[1] All measurements according to ASTM methods made on molded sheets cured 24 hours at 250 C.

[2] Rapid rise, 1/4" electrodes on 1/16" molded sheet.

The improvement in physical and electrical properties obtained with silica aerogel fillers stimulated further interest in fillers of this general type. It was also recognized that the dielectric loss of the silicone polymer approaches that of pure quartz. It is obvious then that if an extremely pure silica could be obtained the excellent dielectric properties of the silicone polymer would not be deteriorated by additions of such a filler. Furthermore, if the silica were pure, the physical and electrical properties would not be affected appreciably by water.

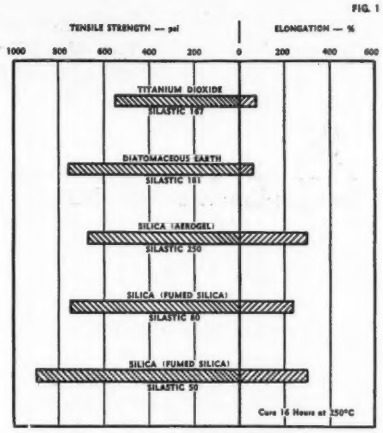
★ ★ ★

Recently, a silica meeting these requirements has been developed. This silica is called "fumed silica" or silica soot. Fumed silica is made by passing silicon tetrachloride through an oxygen and hydrogen flame. The reaction produces a finely divided, chemically pure silica. This silica is the basis for a series of new silicone rubbers that are of special interest to the cable industry. Electrical properties of silicone rubber are no longer limited by the filler since the fumed silica possesses dielectric properties essentially the same or better than those of the silicone polymer. Thus, these fumed silica filled silicone rubbers have the lowest dielectric losses obtainable with the present silicone polymers.

★ ★ ★

Because of the physical nature of the fumed silica, tough, tear resistant silicone rubbers are obtained. By varying the amount of silica in the formulation, rubbers with varying degrees of hardness can be made. In Figure 1, the tensile strength and elongation of commercial silicone rubbers compounded with the various fillers mentioned previously are compared

FIG. 1



PHYSICAL PROPERTIES OF TYPICAL SILICONE RUBBERS

with two typical commercial silicone rubbers compounded with fumed silica especially for cable insulation and identified as Silastic 80, will be described in greater detail. The properties of this silicone rubber are given in Table II.

★ ★ ★

Two silicone rubbers may be blended to give certain specific properties. In general, when two silicone rubbers are blended, most of the properties vary in direct proportion to the amount of the two rubbers in the blend as indicated in Figure 2. These data show the physical properties resulting from the blending of a fumed silica filled silicone rubber with a diatomaceous earth filled stock. The properties at the right and left

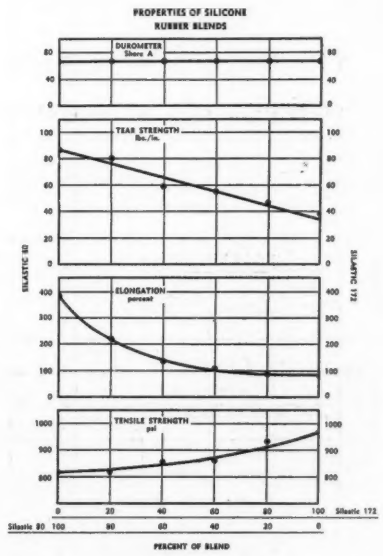


Figure 2 * * * * * * *

hand ordinates are typical of the two stocks before blending. As they are blended in various proportions, the properties are changed in a similar proportion.

★ ★ ★

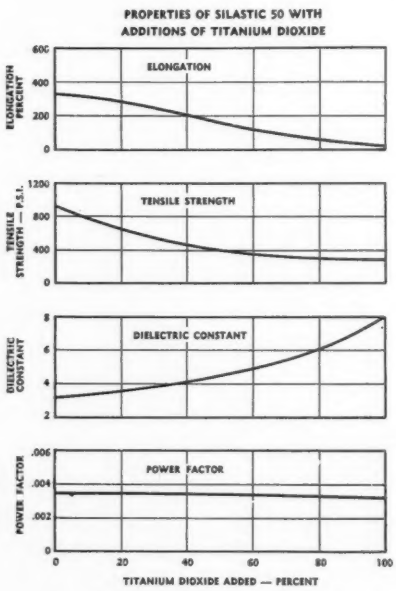
This is also true of the electrical properties that are dependent upon the filler. For these particular stocks, power factor is dependent upon the filler, but the dielectric strength and dielectric constant remain essentially the same. For the blends shown in Figure 2, the dielectric constant and power factor at 100 cycles per second are given below:

Percent of Silastic 80	Percent of Silastic 172	Dielectric Constant	Power Factor
0	100	3.25	0.0064
20	80	3.20	0.0047
40	60	3.14	0.0034
60	40	3.09	0.0024
80	20	3.06	0.0017
100	0	3.04	0.0008

★ ★ ★

A similar change in the properties of a silicone rubber will be obtained when additional filler is added to a compounded stock. For example, the addition of titanium dioxide to a stock containing fumed silica will alter the properties as shown in Figure 3. The

FIG. 3



tensile strength and elongation are decreased as the percentage of

Table II

Typical Properties of Silastic 80

Color	White
Specific Gravity	1.25
Durometer, Shore A	80
Tensile Strength, psi	800
Elongation, %	200
Compression Set at -40 C., % 150 C., % 200 C., %	46 30 70
Dielectric Strength, V/M 1/4" electrodes, rapid rise	
(a) Cond. D 24/25/50	500
(b) Immersed in 70 C water for 7 days	400
Dielectric Constant	
(a) Cond. D 24/25/50 10^2 cps 10^6 cps	 2.92 2.92
(b) Immersed in 70 C water for 7 days 10^2 cps 10^6 cps	 3.48 3.48
Power Factor	
(a) Cond. D 24/25/50 10^2 cps 10^6 cps	 0.0006 0.0006
(b) Immersed in 70 C water for 7 days 10^2 cps 10^6 cps	 0.002 0.0016
Volume Resistivity, Ohm-cm	
(a) Cond. D 24/25/50	$>10^{14}$
(b) Immersed in 70 C water for 7 days	10^{14}
(c) Measured at 200 C	10^{13}
Surface Resistivity, Ohm	
(a) Cond. 24/25/50	$>10^{13}$
(b) Immersed in 70 C water for 7 days	10^{13}
(c) Measured at 200 C	10^{13}
Thermal Conductivity, cal/cm²/°C/cm/sec.	0.513×10^{-3}
Coefficient of Thermal Expansion	$\alpha = 7.2 \times 10^{-4}$ $\beta = 7.76 \times 10^{-5}$
Shrinkage, after curing 24 hours @ 250 C	5%
Brittle Point, °C	-62
Durometer Change at 250 C	0
Water Absorption, 7 days @ room temperature, % 70 hours @ 100 C, %	0.8 2
Chemical Resistance as Indicated by % Swell	
ASTM #1 Oil, 7 days @ 150 C	8
ASTM #3 Oil, 7 days @ 150 C	38
Chlorinated Transformer Oil, 70 hours @ 175 C	36
Acetone, 7 days at room temperature	13
Ethyl Alcohol, 7 days @ room temperature	2
Gasoline Stoddard Solvent Carbon Tetrachloride Toluene Methyl Chloride } 7 days @ room temperature	>150
Sulfur Dioxide, 7 days @ room temperature	2
Freon 12, 7 days @ room temperature	39
Freon 114, 7 days @ room temperature	39

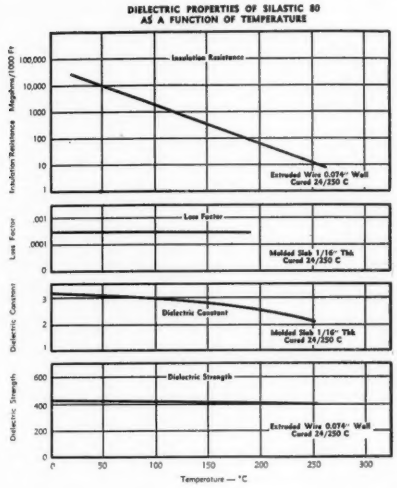
Note: All measurements in accordance with ASTM methods. Tests made on molded sheets cured 24 hours at 250 C.

titanium dioxide increases. Since titanium dioxide has a high dielectric constant, the dielectric constant of the compound will increase as more filler is added. In this example, the power factor remains the same.

★ ★ ★

An outstanding property of silicone rubbers filled with fumed silica is the stability of electrical properties over a wide temperature range. In Figure 4, the electrical properties of Silastic 80 are shown as a function of temperature. Dielectric strength, dielectric constant, and loss factor remain unchanged at temperatures as high as 250 C. Only the insulation resistance of extruded cable shows a decrease with increasing temperature. However, this decrease is not serious within the useful temperature range for the material. Properties at low temperatures have not been investigated completely, but indications are that no significant changes will occur at temperatures down to -50 C.

FIG. 4



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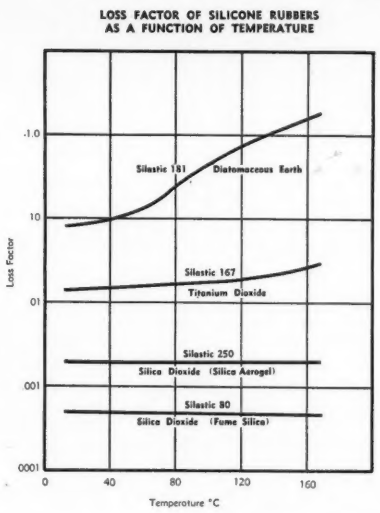
The low dielectric loss of this type of silicone rubber has been mentioned previously. The loss factor of Silastic 80 as a function of temperature is compared with several typical silicone rubbers in Figure 5. It is interesting to note that the loss factor of Silastic 80 is two orders of magnitude below that of a diatomaceous earth filled stock and it does not change with temperature.

FIG. 5



The unusual stability of fumed silica filled silicone rubbers when immersed in water is shown in Figure 6. In this figure, the insulation resistance of 50-foot lengths of extruded cable immersed in hot water is plotted against immersion time. For comparison a silica aerogel filled silicone rubber was tested at the same time and failed in about 3½ months. After more than 11 months immersion in water at 70 C, the Silastic 80 insulated cable shows only a small decrease in resistance and no failure in the near future is indicated. The dielectric strength of cable removed from the water periodically is not changed. The change in capacitance and dissipation factor of this cable is given in Table III. These measurements were made on the same length of cable described above.

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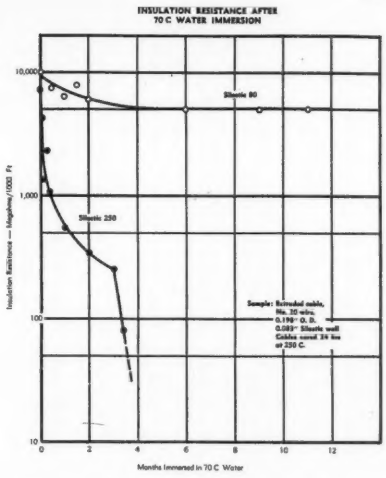
Further evidence of outstanding moisture resistance is the fact that the insulation resistance of a 50-foot length of extruded Silastic 80 cable with an insulation thickness of 0.030" is 2500 megohms per 1000 feet after more than 30 days in boiling water.

FIG. 6



The dielectric constant and loss tangent of silicone rubbers filled with fumed silica do not change appreciably with frequency between 60 cycles per second and 1 megacycle per second. However, at higher frequencies, the loss tangent increases with frequency and peaks at a frequency greater than 10,000 megacycles per second. This increase in loss tangent at the higher frequencies is due to polarity of the silicone-oxygen linkage in the silicone rubber polymer. It is characteristic of all silicone rubbers. The dielectric constant and loss tangent at various frequen-

Table IV

Dielectric Constant and Loss Tangent for Silastic 80

Cycles Per Second	Dielectric Constant	Loss Tangent
10^2	2.96	0.00058
10^3	2.95	0.00052
10^4	2.95	0.0005
10^5	2.95	0.0006
10^6	2.95	0.0006
10^7	2.95	0.0010
10^8	2.95	0.002
10^9	2.93	0.0059
3×10^9	2.90	0.010
10^{10}	2.85	0.0167

Table III

Electrical Properties of Silastic 80 Cable Immersed in Water at 70 C.

Time	Insulation Res. Meg/1000 ft.	Capacitance mf	Dissipation Factor %
0	10,000	0.0034	0.43
6 mo.	5,000	0.0041	0.30
11 mo.	5,000	0.0041	0.10

cies for a sample of Silastic 80 are given in Table IV.

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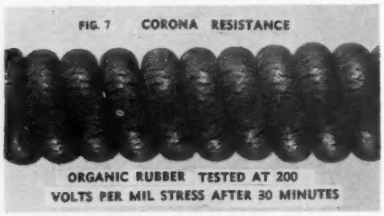
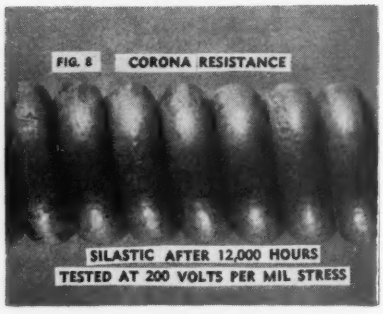
Of the elastomeric insulating materials known today, silicone rubbers are the most resistant to the chemical and electrical effects of corona discharge. The results of a severe corona test are shown in Figures 7 and 8. In this test, samples of extruded cables were wrapped around an insulated mandrel having a diameter equal to that of the cable. A copper screen electrode was then wrapped around the coil of cable. A voltage stress of 400 volts per mil was applied between the cable conductor and the copper screen. Severe corona discharge occurred between the screen and cable surface and electric discharge streamers were observed from the ends of the screen to the cable surface. Organic rubber insulated cables reported to be compounded for corona resistance failed this test in 3 minutes. This sample is shown in Figure 7. The silicone rubber cable failed after 12,000 hours under continuous stress. This sample is shown in Figure 8. It will be noted that there is no sign of deterioration of the silicone rubber. Failure was due to voltage fatigue under the high electrical stress rather than to any effects of the corona.

FIG. 7 CORONA RESISTANCE



ORGANIC RUBBER TESTED AT 200 VOLTS PER MIL STRESS AFTER 30 MINUTES

FIG. 8 CORONA RESISTANCE



SILASTIC AFTER 12,000 HOURS TESTED AT 200 VOLTS PER MIL STRESS

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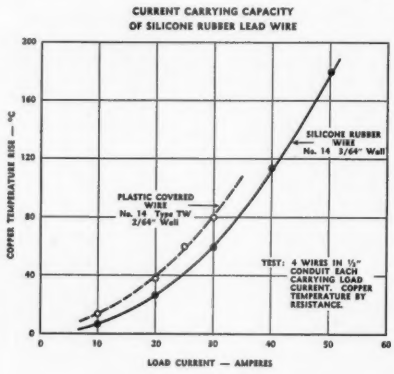
The high thermal conductivity of many silicone rubbers is another property of special interest in power cable applications. In Figure 9 the copper temperature rise of silicone rubber insulated cable is compared with that of conventional thermoplastic insulated cable at various load currents. In this test four cables were placed in a conduit and then loaded from a variable voltage source. The temperature of the copper was determined from its change in resistance. The copper temperature rise of the plastic insulated cable was about 40% higher than the silicone rubber cable at a load current of 10 amperes and 33% higher at 30 amperes. Not only can the silicone rubber cable operate at much higher temperatures than the plastic covered wire, but the silicone rubber cable will be significantly cooler at the same load.

FIG. 9


CURRENT CARRYING CAPACITY
OF SILICONE RUBBER LEAD WIRE
COPPER TEMPERATURE RISE — °C
LOAD CURRENT — AMPERES
SILICONE RUBBER WIRE No. 14 3/64" Wall
PLASTIC COVERED WIRE No. 14 Type TW 2/64" Wall
TEST: 4 WIRES IN ½" CONDUIT EACH CARRYING LOAD CURRENT. COPPER TEMPERATURE BY RESISTANCE.

★ ★ ★

The thermal stability of silicone rubber insulated cable is difficult to define since its life at high temperature will depend greatly upon the application. One test of thermal stability is to age lengths of cable at various temperatures and periodically measure the dielectric strength of the cable insulation. A test of this type shows that the dielectric strength of a Silastic 80 insulated cable remains unchanged after 6 months aging at 250 C.

★ ★ ★

Tests at lower temperatures give increased life. Evaluations of this kind and several years' field experience indicate that silicone rubber insulated cables can be operated continuously at temperatures in the range 150 C to 200 C with a life expectancy equal to that of organic insulated cables at their respective operating temperatures.

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As the temperature is increased above 150 C, however, some decrease in flexibility of the cable will occur. If flexing is a requirement of the application at these higher temperatures, some decrease in life must be expected. However, unlike most organic insulating materials, silicone rubbers do not lose their insulating qualities after aging at high temperatures. When silicone rubbers are completely decomposed by burning, the remaining ash retains its insulating properties. This fact is used to advantage in military control cables that must remain operative after several hours in an open flame.

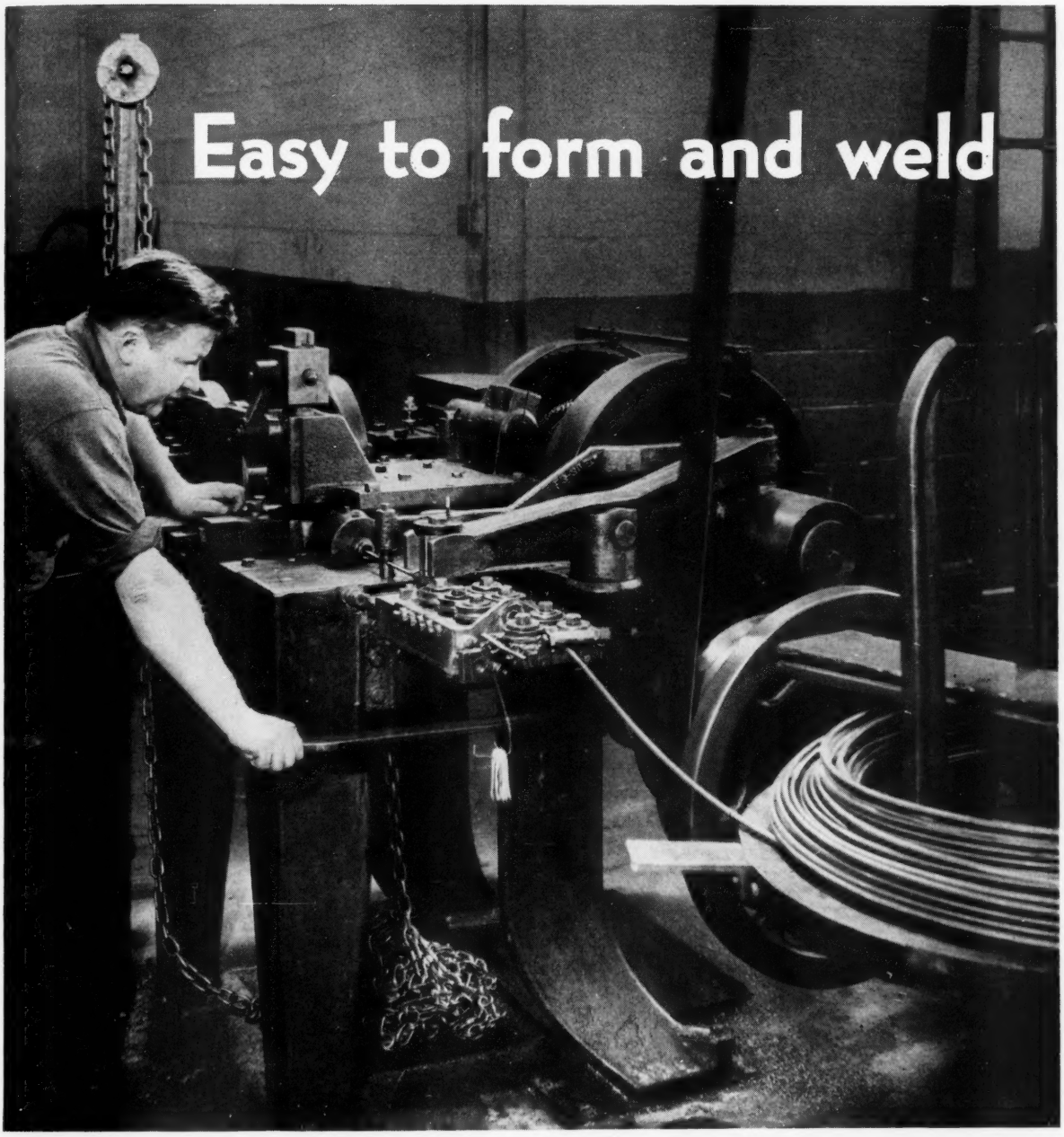
★ ★ ★

A special silicone rubber coated glass cloth is also being used for electrical insulation. Recent work has produced silicone rubber pastes that can be applied in one-pass to glass cloth to form a uniform coating of high dielectric strength. This material in the form of completely cured tapes can be wrapped in conventional equipment to produce electrically insulated cables.

★ ★ ★

For some cable construction a wrapped or taped insulation may be desirable. A semi-vulcanized silicone rubber tape is ideal for such applications. One commercially available tape consists of an impregnated Fiberglas backing with a layer of silicone rubber calendered on one side. The layer of rubber is given a partial vulcanization to facilitate handling. A typical construction consists of several layers of this tape applied on a conventional taping machine followed by a wrap of Fiberglas or cotton stripping tape. The cable is then placed in an oven for a few hours to complete the vulcanization and cure of the silicone rubber tape. The tape will bond to itself to form a solid, tough jacket with high dielectric strength. Cables insulated in the laboratory with 6 layers of 0.010" semi-vul-

(Please turn to page 560)



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Stainless Steel Wire Properties Are Affected By Draw Speed

by Samuel Storchheim, Engineer in Charge
Atomic Energy Division
Sylvania Electric Products, Inc.
Bayside, New York

In this fourth of a series of articles on stainless steel wire processing the author discusses the effects of cold reduction on the properties of this wire. Prior to joining his present company Mr. Storchheim was a Metallurgical Engineer, for the Wilbur B. Driver Company in Newark, New Jersey.

The cold reduction of annealed 18/8 stainless steel tends to transform the nonmagnetic starting structure, austenite, to the magnetic structure, martensite. During wire-drawing, the degree of transformation depends in part upon the composition of the melt, the percent of cold deformation given the wire and the wire diameter.

★ ★ ★

Chemically, carbon, manganese and nickel tend to depress this austenite-to-martensite transformation; while niobium, chromium, molybdenum and silicon promote it. Each of these constituents effect the degree of change that occurs in varying degrees.

★ ★ ★

Usually there is a further conversion to martensite when the percent of cold reduction of area is increased.

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Large diameter wires receiving the same deformation (percent) as finer diameter wires for the same chemical analysis, exhibit less martensite than the finer wires.

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During an investigation of the electrcial and mechanical properties of 18/8 stainless steel wires at the Wilbur B. Driver Co., Newark, N. J., it was observed that even when the preceding factors were kept constant, considerable fluctuations existed in the magnetic properties of the wires produced. An initial study indicated that this inconsistency resulted from variation in the rate of draw of the wire.

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To determine the extent of these variations, a research program was started in which available commercial 302 and 304 stainless steels were drawn over a wide variation of speeds. Magnetic measurements, Br, remanence and Hc, coersive force as well as ultimate tensile strength and specific resistance were determined. Should variations of considerable magnitude be found, it was thought that the information obtained from the investigation could give aid in predicting the particular draw speed required to obtain desired properties for a particular analysis of wire and a given set of specifications.

Procedure

Two different 18/8 wires (Set I, type 302 and type 304), the analyses of which are given in Table I, were drawn at different speeds, namely, 45 to 3900 ft. per minute, from 0.016 in. diameter wire to 0.004 in. diameter wire, a 93.7 pct. reduction of area. In order to obtain this high percentage of reduction, the wire at 0.016 in. was softened by annealing at 2100°F in cracked ammonia. It was then set up in a No. 16 CF variable speed Vaughn drawing unit and strung through 13 B. & S. gage dies of successively decreasing diameter, as shown in Table II. When this was accomplished, several hundred feet of the wire was run off at a particular speed. The next wire sample was drawn at a greater rate, after making the necessary adjustments upon the Vaughn unit. At the higher speeds, several thousand feet of sample were drawn in order to make certain the wire used for subsequent testing would be uniform. This was done because the desired speed of reduction was not attained immediately; the wire taking a short while to attain the required drawing speed. All draw speed measurements were made using a tachom-

TABLE I ANALYSES OF STAINLESS STEELS USED, PCT.

Type	C	Mn	P	S	Si	Mo	Ni	Cr	Fe
				Set I					
302	0.080	0.91	---	---	0.59	0.08	9.41	18.39	bal.
304	0.070	1.07	0.030	0.018	0.40	0.19	8.47	18.91	"
				Set II					
302	0.12	1.50	0.025	0.019	0.70	--	9.40	18.04	"
304	0.071	0.97	0.034	0.030	0.45	0.25	9.85	18.04	"

TABLE II

Set I No. 302 and 304

B.&S. No.	Die Diam., In.
26	0.0159
27	0.0142
28	0.0126
29	0.0113
30	0.010
31	0.0089
32	0.008
33	0.0071
34	0.0063
35	0.0056
36	0.005
37	0.0045
38	0.004

Set II No. 302 and 304

B.&S. No.	Die Diam., In.
13	0.072
14	0.064
15	0.057
16	0.051
17	0.045
18	0.040
19	0.036
20	0.032
21	0.0285

★ ★ ★

eter on one of the machine's pulleys during the actual drawing process.

★ ★ ★

To broaden the scope of the investigation, two additional specimens (Set II, Types 302 and 304), analyses for which are also listed in Table I, were in addition studied for variations in properties. However, these were drawn from heavier diameter starting sized wire, 0.072″, through nine dies to 0.0285″ diam. in a 12 HF Vaughn wire drawing unit. The B. & S. gage numbers and corresponding die diameters used were as shown in Table II. This reduction represents an 84.4 pct. reduction of area. The 0.072 in. diam. wire was likewise annealed at 2100°F in cracked ammonia prior to drawing. The method of getting samples was similar to that described above. The main difference between the two techniques was that the rates of draw for the latter one were not as extensive, set II only covering a range of 625 to 1150 ft. per minute.

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Tabulation of the data obtained using these two 18/8 stainless steel types are given in Tables III to VI. By using the data in the tables, curves were plotted indicating the general nature of the various relationships between the log of the rate of reduction vs. other properties, Figs. 1 to 4.

Discussion of Results

Speed of Draw Vs. Coercive Force: For the specimens of set I, the two analyses exhibited coercive force curves which were similar except they were displaced from each other, see Fig. 1. For specimens from the 302 analysis, the curve indicated that the Hc values were low at low rates of draw, but rose quickly at moderate speeds of draw to a value about 143 pct. greater than that initially found. There was little deviation from this "ultimate" value once it was attained, except that caused by scatter. The curve for the 304 analysis showed an initially lower Hc value than the curve for the 302 analysis at low speeds of draw. This value also increased as did

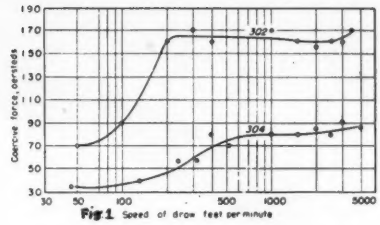

Fig. 1 Speed of draw, feet per minute

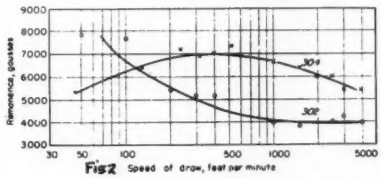

Fig. 2 Speed of draw, feet per minute

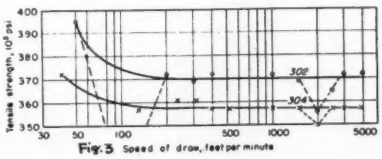

Fig. 3 Speed of draw, feet per minute

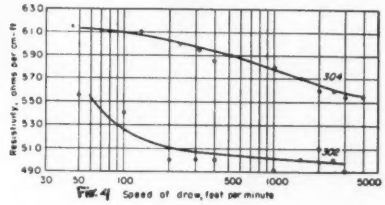

Fig. 4 Speed of draw, feet per minute

the 302 curves, but not as rapidly. The final Hc of the 304 curve as with the 302 curve increased over its initial value by about 143 pct.

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The small range of draw speeds used for set II did not warrant a similar plotting. However, these data plus those of set I indicated that an increase in the amount of

(*Please turn to page* 564)

TABLE III Set I, 302

No.	Rate of Reduction ft. per min.	Hc, Oersteds	Br, Gausses	Ultimate Tensile 10^3 psi	Resistivity Ohm-cm per ft.
1	50	70	7850	395	555
2	100	90	7700	325	540
3	200	160	5450	372	500
4	300	170	5180	369	500
5	400	160	5180	372	500
6	1000	170	4000	372	490
7	1500	160	3850	369	500
8	2000	155	4250	356	510
9	2500	160	4000	365	500
10	3000	160	4250	372	490
11	3900	170	4000	372	485

TABLE IV Set I, 304

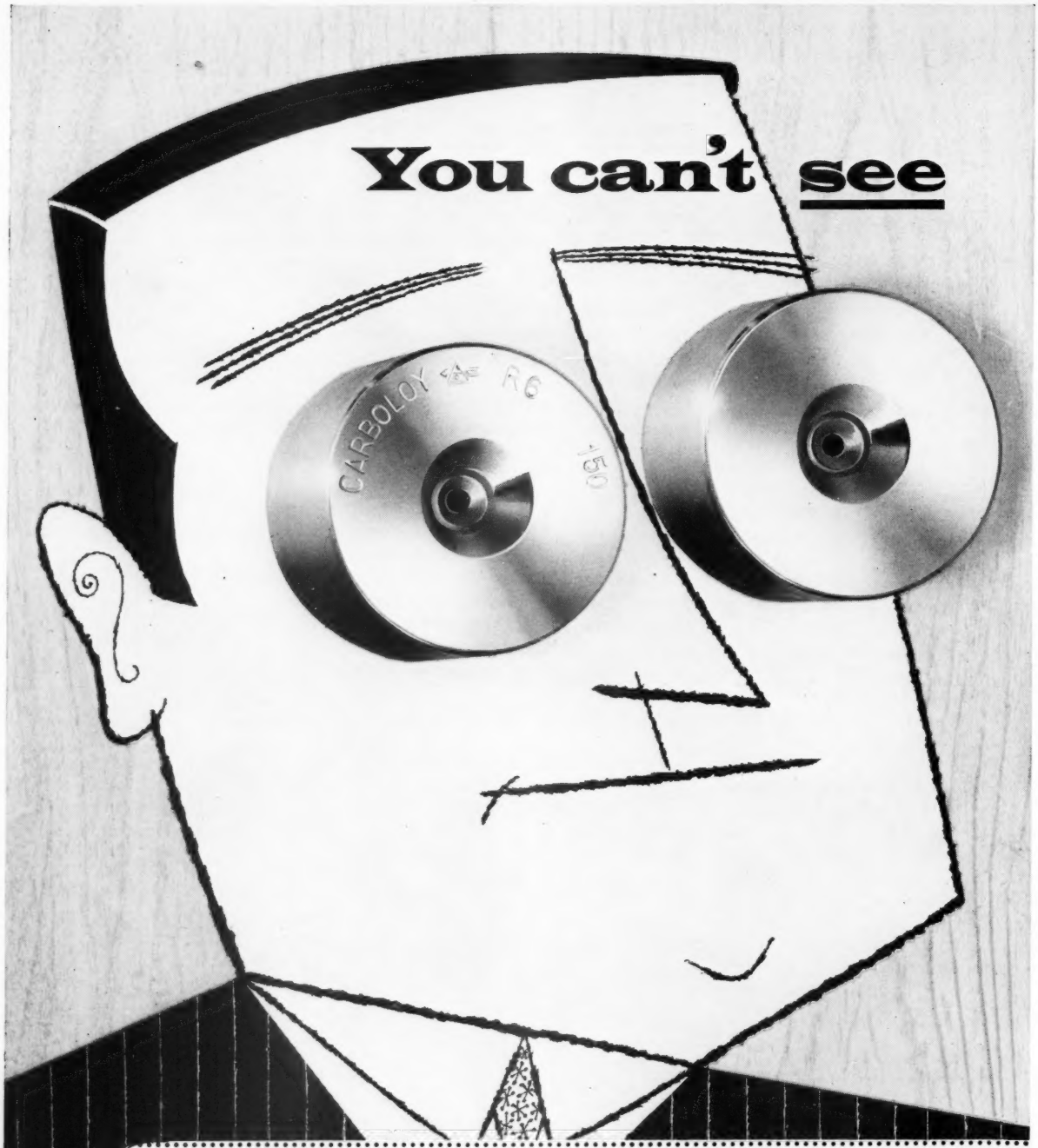
No.	Rate of Reduction ft. per min.	Hc, Oersteds	Br, Gausses	Ultimate Tensile 10^3 psi	Resistivity Ohm-cm per ft.
1	45	35	5330	372	615
2	130	40	6400	357	610
3	235	55	7200	361	600
4	315	55	6930	361	595
5	395	80	7070	357	585
6	510	70	7330	357	590
7	1000	80	6670	357	580
8	1500	80	6400	357	570
9	2000	85	6000	350	560
10	2500	80	6000	357	560
11	3000	90	5460	357	555
12	3900	85	5460	357	555

TABLE V Set II, 302

No.	Rate of Reduction ft. per min.	Hc, Oersteds	Br, Gausses	Ultimate Tensile 10^3 psi	Resistivity Ohm-cm per ft.
1	625	220	1290	271	465
2	710	220	1270	279	460
3	815	210	1450	279	460
4	885	195	350	275	475
5	1000	240	2090	268	470
6	1120	220	2560	270	465

TABLE VI Set II, 304

No.	Rate of Reduction ft. per min.	Hc, Oersteds	Br, Gausses	Ultimate Tensile 10^3 psi	Resistivity Ohm-cm per ft.
1	630	250	1440	251	455
2	740	235	1130	251	450
3	815	255	1130	248	445
4	915	240	1270	251	455
5	1050	240	1440	237	455
6	1150	235	1270	253	450



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Trained engineers, backed by more than 25 years of carbide experience, plus modern Carboloy engineering facilities, are at your service for special wire die problems.

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Your die-room personnel will be instructed in the design, application and maintenance of carbide dies at the modern, completely equipped Carboloy Die Training School at Detroit.

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Carboloy engineering and manufacturing personnel are continually developing new techniques and new methods, which are immediately reflected in lower prices to the customer.

REDUCED PRICES – Prices of many Carboloy wire dies and related products were reduced, effective April 19. Send coupon for new Price List D-135.

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DURCH KALTVERFORMUNG HERVORGERUFENE RUECKBILDUNGSER-SCHEINUNGEN BEI KUPFER-BERYLLIUM. RECOVERY THROUGH COLD-WORKING IN COPPER-BERYLLIUM.
W. Gruhl, U. Gruhl. Metall 1954 Vol 8 (1/2) pp 20-23 (Jan) (In German)
Hardness measurements on precipitation-hardened copper-beryllium sheets after thermal recovery and cold-working indicate that in both cases further precipitation hardening takes place. Authors suggest that temp rise during cold working responsible for recovery. Increase in hardness produced by cold-working becomes smaller as precipitation hardening advances and may even change to decrease. This fact only partially explained by recovery theory. 6 illustr, 10 ref.
H **C 4.0 : C 11.0**

★ ★ ★

NEW METHODS AND INSTRUMENTS FOR THE INSPECTION OF DRAWING DIES
W. Lueg. Stahl & Eisen 1951 Vol 71 (4) pp 157-170; Wire Ind 1954 Vol 21 (241) pp 63, 65, 67 (Jan) (Original in German)
13 illustr, 3 ref. See Bibl Ind Diamond Appl 1951 Vol 8 p 280.
R **C 11.0**

★ ★ ★

DER BAUSCHINGER-EFFEKT UND SEINE PRAKTISCHEN AUSWIRKUNGEN. THE BAUSCHINGER-EFFECT AND ITS PRACTICAL IMPLICATIONS
W. Spaeth. Metall 1954, Vol 8 (1/2) pp 25-29 (Jan) (In German)
Examination of distribution and movement of internal stresses and slip lines under constant strain and load, based on model. Single crystal will have residual stresses even when slip has traversed entire lattice plane; moreover, movement of slip lines produces secondary slip lines, leading to work softening in direction perpendicular to preceding deformation. Work required for shaping metal parts can therefore be reduced if parts worked alternately in mutually perpendicular directions. 5 illustr, 11 ref.
H **C 6.0 : C 11.0**

★ ★ ★

AUSTRALIAN SYMPOSIUM ON WIRE-DRAWING
Anon. Wire Ind 1954 Vol 21 (241) pp 49, 51 (Jan)
Symposium on 'The theory and practice of wire drawing' organized by Melbourne Branch, Phys Metall Div, Austral Inst Metals, Nov 13, 1953 'Some researches in wire-drawing' by F. C. Thompson: theoretical consideration of equation involving drawing speed, die load and angle; practical aspects of area reduction, yield stress, temp and metal flow discussed. 'Researches concerning wire drawing dies' by J. G. Wistreich: die pressure, temp, lubrication and wear investigated. 'The problem of rod diameter' by C. Blazey and V. W. Benjamin: reasons for using definite nominal dia for rolled rods. 'Australian developments in drawn-galvanized rope wires' by F. W. Welshman and C. James: wire drawn in galvanized condition is superior to hot-dipped, and equal to bright-drawn wire. 'Core wire for the production of extruded metal-arc welding electrodes' by W. I. Pumphrey. 'Surface temperature—lubrication relations during drawing of copper wire' by J. S. Hoggart: surface temp determined by thermocouple die for 3 lubricants over 26 to 1,380 ft/min speed range; relation to friction coeff and speed discussed; experimental results used to compare lubricants and lubrication mechanisms. 'The effect of surface temperature attained during drawing on the tensile strength of copper wire' by J. S. Hoggart and S. Z. M. Kopczynski: relation between these explained in terms of stress distribution of wire and theory of flow and fracture.
R **C 11.0**

★ ★ ★

THE METHOD PARTIALLY IMPROVED TO PRODUCE ALUMINUM SINGLE-CRYSTAL WIRE AND PLATE HAVING ANY DESIRED CRYSTALLOGRAPHIC ORIENTATIONS
T. Fujiwara, K. Koizumi. Hiroshima Univ Journ Sci A 1952 Vol 16 pp 81-84; Chem Abstr 1953 Vol 47 (21) col 11104 (Nov 10) (Original in English)
Y **C 11.0**

★ ★ ★

THEORETICAL AND PRACTICAL DETERMINATION OF THE BEST SHAPE OF WIRE-DRAWING DIES
J. Hoell. Hutnik (Prague) 1953 Vol 3

MODEL "J" TYPE AUTOMATIC MICRO-WELD BUTT WELDER

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This type welder is available in four Models (J-45-C) (J-5-C) (J-7-C)(J-8-C) for welding COPPER, ALUMINUM, and other nonferrous wire and rods, ranging in size from .080" to ½" diameter.

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(6) pp 130-134; abstr Iron & Steel Inst Journ 1954 Vol 176 (1) p 122 (Jan) (Original in Czech)
M C 11.0 : D 11.0

★ ★ ★

DRAWING
I. A. Iuchvec. Sowjet Buchneuerscheinungen 1954 Vol 3 (3) p 60 (Jan) (Original in Russian)
Book, Metallurgizdat, 320 pp. Theory and practice of wire drawing, influence of drawing on properties of steel wire, processes for preparing steel surface, and technology of drawing, in particular lubrication. Textbook for students in metallurgy.
G C 11.0

★ ★ ★

MEASUREMENT OF THE VARIATION OF THE FREE ENERGY OF A METAL [COPPER] DURING COLD WORKING
R. Jouty. CR Acad Sci 1953 Vol 237 (9) pp 488-489; Inst Met Journ: Metall Abstr 1954 Vol 21 (5) col 403 (Jan) (Original in French)
Y C 4.0 : C 11.0

★ ★ ★

X-RAY AND ELECTRON-MICROSCOPIC STUDIES ON THE COLD-WORKING OF METALS AND ALLOYS
T. Morinaga (Tokoyo Inst Technol), N. Shiota, C. Onozaki. Nippon Kinzoku Gakkai-Shi 1951 Vol B 15 pp 524-528; Chem Abstr 1953 Vol 47 (22) col 12189 (Nov 25) (Original presumably in Japanese)
Y C 4.0 : C 11.0

★ ★ ★

PREPARATION OF THIN ROCK-SECTIONS
E. O. Rowland. Mineralog Mag 1953 Vol 30 (223) pp 254-358 (Dec); Ind Diamond Rev 1954 Vol 14 (158) p 39 (Feb)
See Bibl Ind Diamond Appl 1954 Vol 11 p (Feb).
X C 8.6

★ ★ ★

A PRACTICAL REVIEW OF CARBIDE DRAWING DIES
L. E. Sanderson. Wire Prodn 1953 Vol 2 (6) pp 19-21; Inst Met Journ: Metall Abstr 1953 Vol 21 (4) col 381 (Dec)
Brief review of dimensions and make-up of tungsten carbide dies for drawing both ferrous and nonferrous wire, rod and tube. Practical advice for prolonging die life.
Y C 11.22

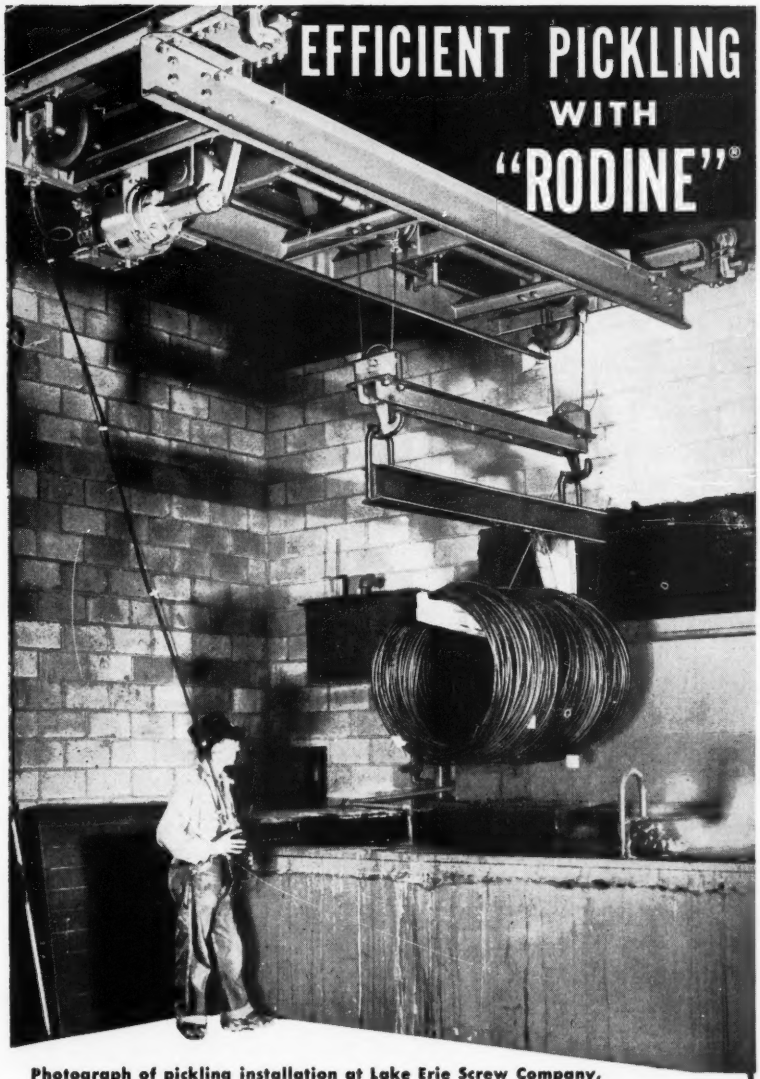
★ ★ ★

DIE COST DISTRIBUTION IN WIRE DRAWING
Anon. NACA Bull 1953 Vol 34 pp 1438-1442 (July); Ind Arts Index 1954 Vol 42 (2) p 270 (Jan)
Y C 11.0

★ ★ ★

DAS BESTIMMEN DER ZIEHHOLFORM AN HARTMETALLZIEHWERKZEUGEN. THE DETERMINATION OF THE DRAWING CHANNEL IN SINTERED CARBIDE DRAWING DIES
K. Schimz. Draht 1954 Vol 5 (1) pp 17-18 (Jan) (In German)
Explaining different parts of drawing die and referring to Zetmeter and gauge for checking conical needles supplied with this instrument. 3 illustr.
G D 11.0

★ ★ ★



Photograph of pickling installation at Lake Erie Screw Company, by courtesy of The American Monorail Company, Cleveland, Ohio.

Rod and wire are pickled clean in "Rodine"-inhibited acid without waste of either acid or metal. Breakage in drawing, from acid brittleness, is minimized.

Wire and rod, pickled with "Rodine", as compared with less effective inhibition, are larger in diameter, and when drawn to the finished gauge the coils are longer and correspondingly heavier.

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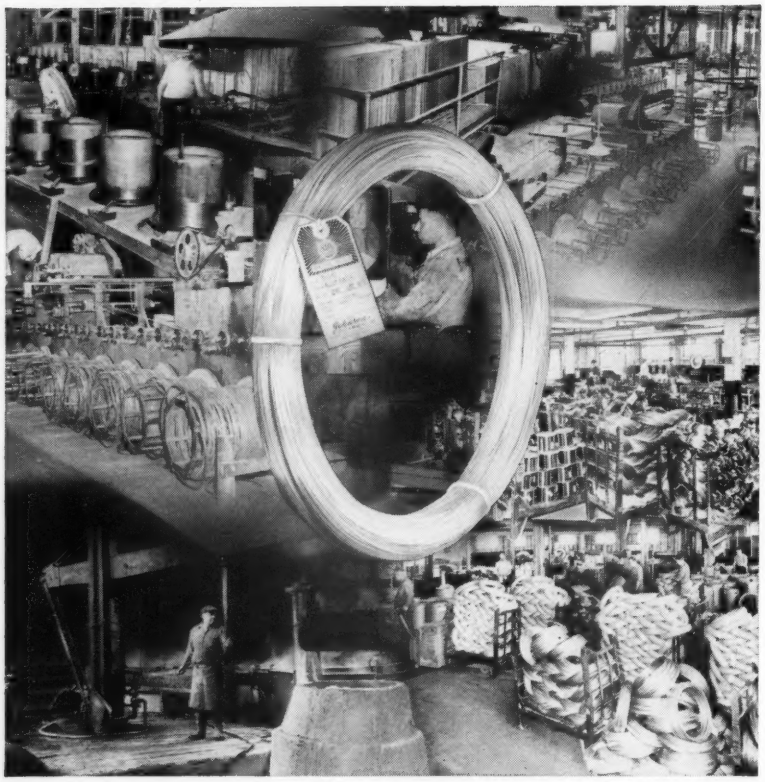

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Our sales representatives are paid to talk, but always when they know what they are talking about. They may not be able to suggest an answer to some of the complex problems of the affairs of state, but, when they have something to say about high carbon wires they speak from the book of knowledge—compiled through more than a quarter of a century of Johnson experience in the drawing of the highest grade specialty wire. These are "custom made" wires, made by special equipment employing special skills and a conscientious endeavor to make the best—better.

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A SUBSIDIARY OF PITTSBURGH STEEL COMPANY

These abstracts have been furnished by the Industrial Diamond Information Bureau, 32 Holborn Viaduct, London E. C. 1, England, and are published through their courtesy. Kindly direct inquiries regarding them to the Bureau.

"Ferrous Process Metallurgy"

This new book by the late John M. Bray, Professor of Metallurgical Engineering of Purdue University, has been brought out by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. It runs 414 pages of text, is amply illustrated and sells for $6.50. The book is the third edition of an earlier book by the same title, containing a number of revisions of material.

★ ★ ★

It is primarily concerned with the reduction and refining of ferrous metals and, hence, the first chapter is devoted to a discussion of iron ores and the materials required for their reduction. Other chapters treat successively of the blast furnace, wrought iron, the Bessemer process, the basic open hearth process, the acid open hearth process, electric furnaces and ingots and moulds.

★ ★ ★

Intended primarily as a text book for engineering students, it is nevertheless, valuable for steel executives and salesmen who would like to have a comprehensive understanding of steel production. Illustrations are simple line drawings to get concepts over without complicating them by unnecessarily involved details; statistical data has been kept at a minimum, including only those for important countries and significant years.

★ ★ ★

Free use is made of physical chemistry to explain physical processes and to predict future developments.

ASTM to Publish Directory of Commercial and College Laboratories

The Directory of Commercial and College Laboratories, hitherto compiled and published by the **National Bureau of Standards** of the U. S. Department of Commerce,

will be published in the future by the **American Society for Testing Materials,** according to a recent agreement between the two organizations. First published in 1927, the Directory has been periodically revised. It provides interested persons with information concerning the location of testing laboratories together with the types of commodities and the nature of the investigations the laboratories are prepared to undertake.

★ ★ ★

ASTM is now gathering data for the revised edition of the Directory. Every known testing laboratory will be requested to furnish information about its testing activities. Efforts will be made to reach laboratories not now listed through appropriate notices in the technical and business press.

★ ★ ★

The Directory is designed to be of assistance to the large number of purchases who are not equipped to make their own acceptance tests and therefore have hesitated to buy on specifications. The knowledge that they can, at any time, call upon testing laboratories to check deliveries made to them on specifications should induce many purchasers to take full advantage of the specification method of buying. It will also be of value to small manufacturers and others who are seeking testing laboratory services in the evaluation of raw materials and finished products.

★ ★ ★

Until the revised ASTM Directory is completed, the present Directory, National Bureau of Standards Miscellaneous Publication M187, published in 1947, will continue to be available from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

The Best Companies in America

The top 348 industrial organizations in the United States and Canada for the year 1953 have been named by the **American Institute of Management** in its Manual of Excellent Managements. The Manual, and the listed companies,

A BOOK EVERY WIRE MAN

SHOULD OWN AND READ . . .

"STEEL WIRE IN AMERICA"

written by Kenneth B. Lewis, as only he could write. This remarkable book treats of the various operations in wire making, giving the history and theories underlying each process, tracing the development of machinery, equipment and supplies used in the industry, and naming those individuals and companies involved in the evolution of our industry to its present stage of development. A highly readable treatise. You'll like it!

The book, sponsored by the Wire Association, is an unusual contribution to the literature on the art of making wire. It is not a handbook nor reference work, but is one that will bear much reading, re-reading and study. Any wire man will be better equipped for his work through a knowledge of the contents of Mr. Lewis' book.

The edition is limited and orders can be filled only as long as the small supply lasts.

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Tests now being conducted indicate a life of 12 times that of wooden reels. Minimum maintenance.

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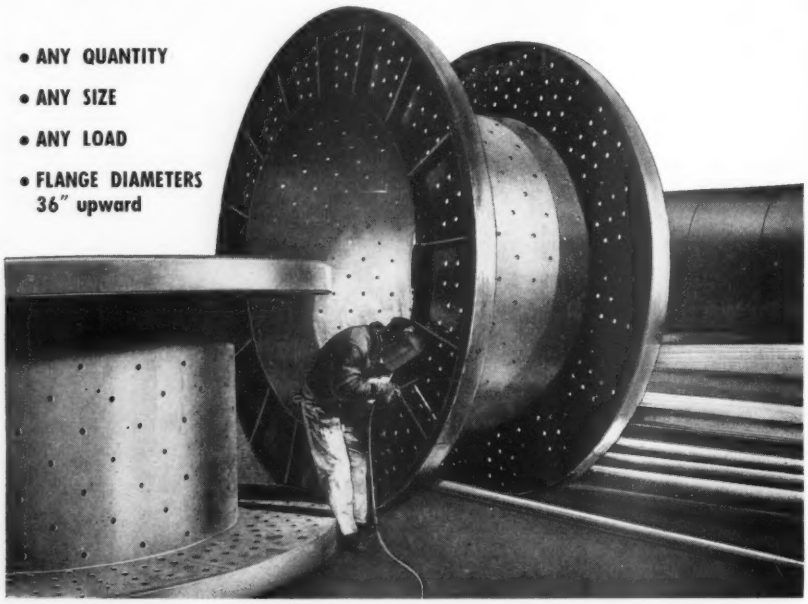

are the result of the year's study of some 4,000 businesses through the United States and Canada according to the institute's Comparative Management Audit methods.

★ ★ ★

The Manual lists all 348 excellently managed companies in four basic lists, broken down alphabetically, for ease of reference, by industry, geographically, and by the Institute's rating within the 348 companies themselves. There are also supplementary lists showing the companies with the greatest growth potential, the best records of stability of net income, and the most outstanding outside boards of directors. A final listing shows the uninterrupted cash dividend records of all 348 companies.

★ ★ ★

In addition, the Manual briefly discusses the Management Audit methods of the Institute, and analyzes the scope of the method and the reasons behind the entire operation of management auditing as it has been developed by AIM.

★ ★ ★

A special feature of the book is a full-scale public Management Audit of The National Cash Register Company, one of the top twelve companies in the country in 1953. National achieved a 9,400 point rating out of a possible 10,000 on the Institute's scale. The Audit is presented "because National is one of the best of all companies, as an example of the methods by which the Excellently Managed Lists are formed, and as a significant contribution to a better understanding of management methods in general," according to **Jackson Martindell,** president of the Institute.

★ ★ ★

The purpose of the Manual is to enable everyone concerned with management appraisal and improvement to compare the management records of various companies, industries and areas, so that a more accurate judgment of a company's performance in management can be made, relative to the listed companies.

★ ★ ★

Copies of the Manual, a 96 page book, are being distributed to the

Institute's 12,000 members in top management, and are available to anyone interested. Copies can be obtained from The American Institute of Management, 125 E. 38th St., New York 16, N. Y.

NOPCO Elects New Chairman

The Board of Directors of **Nopco Chemical Company,** at its annual meeting on March 25th in Harrison, N. J., elected **Thomas A. Printon** Chairman of the Board, as well as President of the company. As Chairman of the Board he succeeds **Charles P. Gulick.** In recognition of Mr. Gulick's long and distinguished service to Nopco, the Board designated him as Honorary Chairman of the Board.

★ ★ ★

Mr. Printon was born in Medford, Mass., and has been with Nopco since 1922. He has served as Director of the company since 1936, and has held the office of President since 1949.

★ ★ ★

Nopco Chemical Company, founded in 1907, is a corporation with assets of over twelve million dollars. It has three manufacturing plants in the United States and one in Canada.

Scovill Increases Weight of Continuous-Cast Brass Bars

Scovill Manufacturing Company, Waterbury, Conn., the only brass company in America to produce continuous-cast flat metal bars, has raised the weight and size of its standard bar from 2,200 to 3,100 pounds, it is announced by **C. P. Goss,** vice president.

★ ★ ★

This is Scovill's third major contribution in the field of continuous casting of brass since its introduction, on a large-scale basis, of this method into the United States in 1938. The others were in continuous casting first of billets and subsequently of flat bars.

★ ★ ★

Preparations for introduction of the 3,100 pound bar were started over a year and a half ago, less than three years after the brass firm opened its new $10,000,000

FOR TODAY'S BETTER PRODUCTS

WEAVING
STAPLING
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If the product or end-use requires high grade wire of *proven dependability* and *uniformity*—it's a job for Seneca!
Specify Seneca for all your needs today—whether it's fine wire for weaving or heavier types for springs, etc. High carbon or low carbon steel wire . . . aluminum . . . bronze. Sizes No. 40 W & M gauge (.007) and larger. Many shapes—round, half round, square, flat, straightened and cut. Choice of finishes—bright, soft annealed, coppered, liquor finish, tinned, bright galvanized, oil tempered, enameled.
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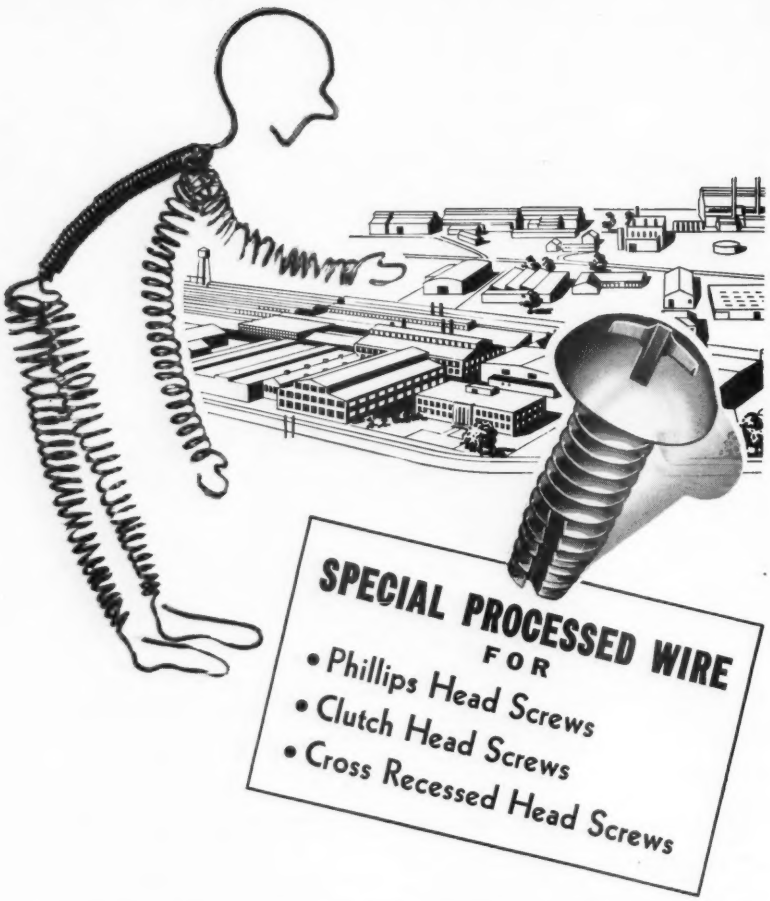

PRODUCTION CAPACITY DOUBLED

To keep pace with the rapid increase in the use of recessed head screws, Keystone is doubling its capacity in the manufacture of "Special Processed" wire.

The unusual qualities of Special Processed Wire are recognized by licensed manufacturers of recessed head screws. This wire has also proved itself superior on many other difficult cold heading jobs.

Our additional capacity will enable us to meet the ever-increasing demand for "Special Processed" wire by our present customers and at the same time welcome new customers.

Keystone Steel & Wire Company
PEORIA 7, ILLINOIS

automatic, quarter-mile-long continuous strip mill in late 1949.

★ ★ ★

During the past 18 months every step from casting, rolling, annealing and slitting to shipping has been modified and new equipment added to handle the increased size and weight of the new bar.

Self Centering Wire Stripper Provides Extra Cutting Edge

A triple-disc cutting mechanism that automatically centers the wire it strips of insulation and provides its own extra cutting edges is the feature of the High Speed Wire Stripper manufactured by **High Speed Hammer Co., Inc.** of Rochester, N. Y.

★ ★ ★

Insulation is removed by three hardened steel discs that are angled into cutting position slightly overlapping each other. Preadjusted to cut thru the insulation, the slight pressure on the core of the wire at the intersection of the three arcs centers the work for extreme accuracy.

★ ★ ★

The machine, a ¼ H.P. bench model designed for high speed production line stripping, removes all types of insulation including plastic types from solid, stranded or multi-conductor wire. Provision has been made for simple adjustments for diameters up to ½" and for strips to 1½" in length. Performances of 3000 strips per hour have been reported.

New Manual on Heat Treating of Aluminum Alloys

The metallurgy involved in the heat treatment of aluminum alloys is covered in a simplified, non-technical manner in a special section of a new manual, "HEAT TREATING ALUMINUM ALLOYS," published by **Reynolds Metals Company.** This unusual discussion presents the underlying principles having to do with the metallurgy of aluminum heat treatment.

★ ★ ★

Section Two is written for the metallurgist. Here will be found full metallurgical details on the

wrought aluminum alloys, the cast aluminum alloys, the wrought alloy numbering system, and the temper designation system. Both heat-treatable and non-heat-treatable aluminum alloys are covered.

★ ★ ★

Other chapters are devoted to annealing, stabilizing, solution heat treatment, and aging or precipitation hardening. Furnaces, salt baths, and other equipment involved in heat treating aluminum are also discussed. A glossary of terms is included.

★ ★ ★

Section Three presents in tabular form complete technical processing data with recommended times and temperatures. Separate tables cover recommended practices for solution, precipitation (artificial aging), and annealing treatments of the wrought aluminum alloys.

★ ★ ★

Also included are tables showing typical mechanical properties produced by the various heat treatments of the wrought aluminum alloys as well as the sand casting, permanent-mold casting, and die casting alloys.

★ ★ ★

The manual will be sent without charge to engineers, metallurgists, instructors, and technical men requesting it on company letterhead. To others, the price is $1.00 per copy.

Bibliography of Industrial Diamond Applications

The Diamond Tool Industry in 1953. 7 x 9½ in., 8 pp. Issued by the Industrial Diamond Information Bureau, 32-34 Holborn Viaduct, London, E C 1. Free of charge.

★ ★ ★

This report, the ninth in succession, summarizes the main developments during the year 1953. The following fields are reviewed: diamond as a material, properties of diamond, synthesis of diamond, hardness and microhardness, surface finish, fine boring and fine turning, truing of grinding wheels, diamond powders, impregnated dia-

High Speed Precision Straightener For Wire As Small As .007"!

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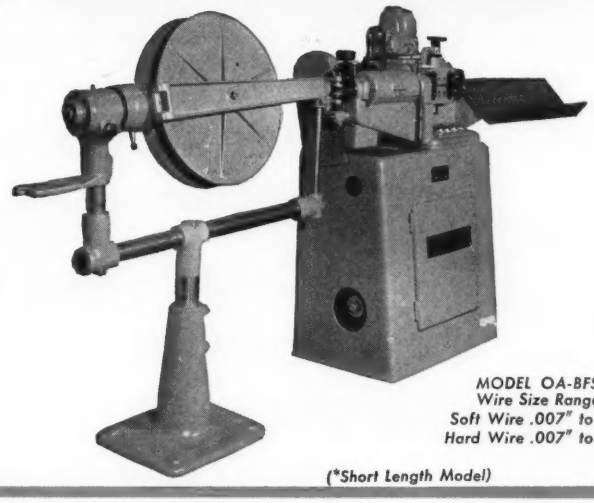

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- Adjustable rotary die straightening mechanism insures maximum precision for any size wire within range of machine. Disc-type cutoff, with only 2 moving parts, is electronically operated. Protects against swelling and expansion of wire ends
- Floor space 7'4" x 2'0" plus length of runout section. Requires only 2 H.P.
- A "must" for manufacturers of needles, watches, other small assemblies in which precision-straightened fine wire is used

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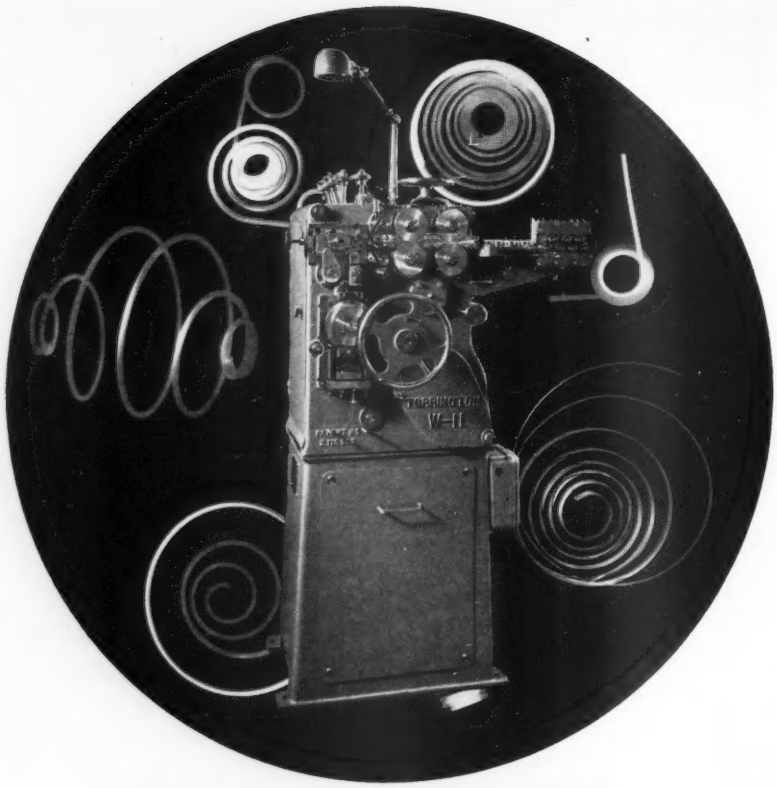

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mond tools, sintered carbide grinding, glass grinding and stone working, rock drilling, wire drawing, diamond use and salvage, new machining methods, and jewel bearing production.

★ ★ ★

With each section references are given to literature, a total of 155 references being quoted. This year's report refers in particular to new developments in hardness and microhardness testing, diamond powders, impregnated diamond tools, and diamond use and salvage. The report will be of interest to all those engaged in the use and production of diamond tools. This summary is mainly based on a monthly bibliography that has been published for 10 years by the same organization.

★ ★ ★

Copies of this bibliography can be obtained, free of charge, by those interested in the diamond and diamond tools.

New Folder on Bakelite Polyethylene

Information about molding, extruding and other ways to use Bakelite polyethylene as well as properties of resins is presented in a new, 8-page folder published by **Bakelite Company,** a Division of Union Carbide and Carbon Corporation.

★ ★ ★

Entitled "Bakelite Polyethylene," the folder also contains photographs showing principal applications of the material for packaging, wire covering, housewares, pipe and industrial products.

★ ★ ★

Three tables list properties of various Bakelite polyethylene resins available in commercial and experimental quantities and also of compounds that are blended with suitable colorants and antioxidants and made available as molding, extrusion and electrical compounds.

★ ★ ★

Copies of this folder (GA) may be obtained from Bakelite Company, 300 Madison Avenue, New York 17, N. Y.

Outstanding Personalities of the Wire Industry

Machinery Company Announces Changes in Management Positions

The Waterbury Farrel Foundry and Machine Co., Waterbury, Conn., producers of a varied line of mass-production metal-working machinery, announces the following changes in position of company officers.

* * *

The Board of Directors elected **Joseph M. Schaeffer** as new President of the concern. Mr. Schaeffer was formerly a Vice President and Director of the company and Chief Engineer of the Bolt Nut & Screw Machinery Division.

* * *

Richard L. Wilcox, former President was elected Chairman of the Board to succeed **David C. Griggs,** the retiring Chairman. Mr. Griggs will continue as a Director of the company.

* * *

Vice Presidents re-elected were **Fred S. Van Valkenburg** and **Irving H. Tolles. Richard C. Bannon,** Cleveland office Sales Manager was newly elected as Vice President.

* * *

A. Dale Mitchell was elected to the office of Treasurer, succeeding **Lewis S. Reed,** who is retiring.

* * *

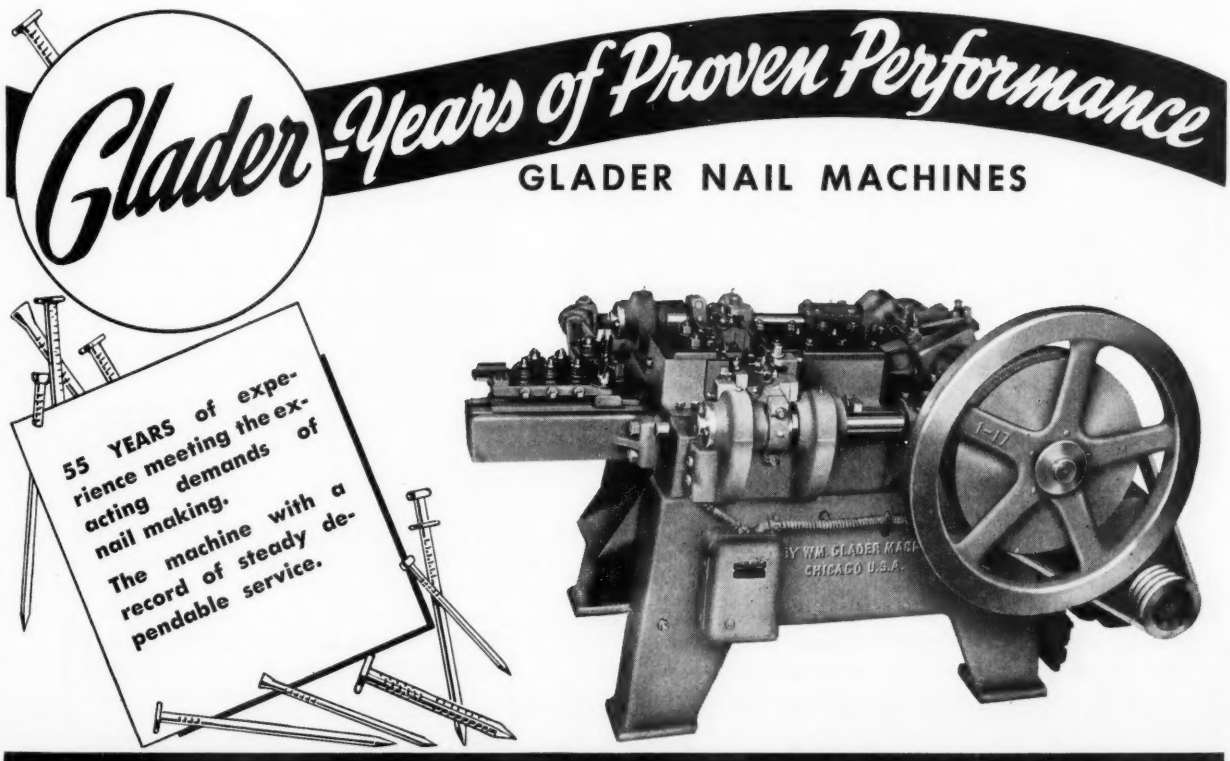
Mr. Schaeffer, the new Waterbury Farrel President, is a graduate of Sheffield Scientific School, Yale University. He began work with the company as an apprentice machinist in 1905. In 1912 he was given the assignment of establishing a European office for the company in Berlin. Returning to this country, at the outbreak of World War I, he continued in Sales and Engineering for the Bolt, Nut and Screw Machinery Division, becoming Chief Engineer and Sales Manager for this division in 1947. He has traveled widely for the company, and has achieved international recognition as an authority in the field of cold process bolt, nut and screw machinery.

* * *

Mr. Griggs, who is retiring as Board Chairman, but who remains a Director, joined the company in 1893 as Mechanical Engineer. He was subsequently a Director and Secretary of the Company and became President and General Manager in 1930. He continued in this office for 17 years, successfully piloting the Company through the depression and World War II. In 1947 he was elevated to Chairman of the Board.

* * *

Mr. Wilcox, the new Chairman of the Board held the office of President from 1947 to the present time. He first joined the company


Glader—Years of Proven Performance
GLADER NAIL MACHINES
55 YEARS of experience meeting the exacting demands of nail making.
The machine with a record of steady dependable service.
Wm. GLADER MACHINE WORKS
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CHICAGO 7, ILLINOIS
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as a draftsman in 1898. During the years of his administration as President, the company has seen unprecedented business activity and continued growth.

New Representative for Promat In Northern California

The Promat Division of **Poor & Company,** Waukegan, Illinois, has announced the appointment of **Industrial Materials Company,** 383 Brannan St., San Francisco, as Northern California distributor for for PROMAT metal finishing processes. Included in their line will be Probrite White Alloy, Promat copper, cadmium and zinc electroplating processes and Promat chromate treatments.

★ ★ ★

Howard J. Lackey, Jr., owner of Industrial Materials Company, is a graduate of the University of California at Berkeley. The firm's activities cover Central and Northern California, handling supplies and equipment for the metal finishing industry.

Appointments by Garfield Wire Division of Overlakes

Eric B. T. Kindquist, former wire mill superintendent and assistant works manager for the **Eastwood Nealley Corp.,** has been appointed vice president and general manager for the **Garfield Wire Division** of the **Overlakes Corporation,** according to an announcement by **F. L. Hewitt, Jr.,** president of the Overlakes Corporation.

★ ★ ★

Mr. Kindquist began his metallurgical career in the research laboratory of the International Nickel Co. at Bayonne, N. J., later becoming research engineer for the R.C.A. Manufacturing Co. at Harrison, N. J. For several years he was associated with the Battelle Memorial Institute at Columbus, O., as a research engineer specializing in the physical metallurgy of non-ferrous metals. He graduated from Pratt Institute and took graduate courses at both N.Y.U. and Ohio State.

Melvin Schwartz, formerly associated with **Alpha Metals, Inc.** in regional sales management, has been appointed general sales manager for the **Garfield Wire Division.**

★ ★ ★

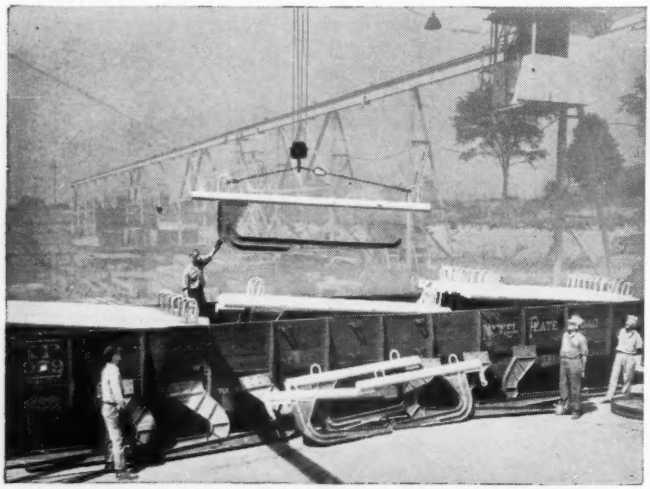
Mr. Schwartz is an industrial engineering graduate of New York University; an electrical engineering graduate of the New York State Signal Training School; and an associate member of the Institute of Radio Engineers.

★ ★ ★

The Garfield Wire Division manufactures single-end copper wire, fine enameled magnet wire and copper wires electroplated with tin, silver, lead and brass.

Made District Managers by Celanese

William L. Milheim, William B. Sinclair, W. D. Matthews and **J. W. Morton,** all of whom have been connected with the sales department of the Chemical Division of Celanese Corporation of America for varying periods, have been pro-



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● Here's another carload of Weldco hairpin hooks, ready for shipment to one of the country's largest steel plants. These pickling hooks are lightweight but tough . . . designed to handle loads as heavy as 3,000 to 5,000 pounds, easily and safely. Weldco hairpin hooks withstand hot pickling acids, too; in fact, they're more corrosion-resistant—more durable—than many heavier hooks.

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moted to District Sales Managers effective March 1, 1954.

★ ★ ★

Mr. Milheim is in charge of the southeastern district with offices in Charlotte, North Carolina. Mr. Sinclair is district manager for New England with offices in Boston, Massachusetts. Mr. Morton and Mr. Matthews are metropolitan and mid-Atlantic district managers, respectively with offices in New York City.

Sales Appointments by Carpenter Steel

Omar V. Greene has been appointed General Sales Manager, according to an announcement by **H. S. Potter,** Vice President, **The Carpenter Steel Company,** Reading, Pa.

★ ★ ★

At the same time, the company named **John W. Thompson** Manager of Sales Development, a new Reading staff assignment. Both appointments became effective April 1st.

★ ★ ★

Mr. Greene was formerly New England Manager for Carpenter with headquarters in Hartford, Connecticut. He joined the company in 1928 as a Metallurgist and in 1940 became Manager of Tool and Alloy Steel Sales. Before his New England appointment, he served in Reading as Assistant General Sales Manager and Manager of Product Development.

★ ★ ★

Mr. Thompson, formerly Product Manager at Carpenter's home office, started with the company in 1939 as Sales Engineer in the Cleveland area. He came to Reading in 1943 when he was promoted to Assistant Manager of Alloy Steel Sales. In 1946 he was named Manager of Alloy Steel Sales.

★ ★ ★

Other promotions announced by the company were: **F. J. McCarthy, Jr.** from Assistant Manager to Branch Manager at Hartford, Conn.; **J. D. Nelson** from Assistant Manager to Branch Manager at Providence, R. I.; and **F. J. Weldon** from Assistant Manager to Branch Manager at Bridgeport, Conn.

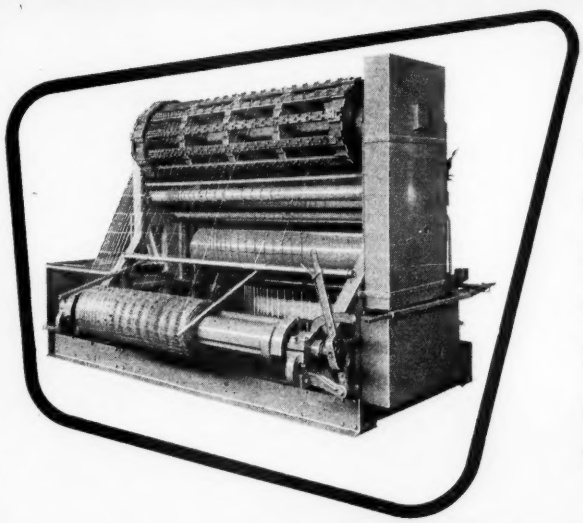
Glass Fibers Makes Solon Assistant to President

Faustin J. Solon, Jr., Vice President of **Glass Fibers Inc.,** has also been appointed Assistant to the President of the company in charge of public and trade relations, according to an announcement made by **R. H. Barnard,** company President.

★ ★ ★

In his new position, Mr. Solon will have full responsibility for development of the trade relations department, a new marketing function with the company. He will also continue previous public relations activities in civic affairs, stockholder relations, publicity and news bureau supervision.

Interlocking FENCE LOOMS



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Avery Adams New Pittsburgh Steel Chairman

Announcement has been made of the resignation of **Joseph H. Carter,** who retired due to ill health, and the election of **Avery C. Adams** as chairman of the Board of the **Pittsburgh Steel Company,** Pittsburgh, Pa., to replace him.

★ ★ ★

Mr. Carter's son, **Joseph R. Carter,** is Vice President, Operations, of Pittsburgh Steel's subsidiary, **Johnson Steel and Wire Company,** Worcester, Mass.

Made Officer and Director of Cleveland Firm

As of March, 1954, **John P. Zur** was elected Executive Vice President and a member of the Board of Directors of **The Trauwood Engineering Company,** Cleveland, Ohio.

★ ★ ★

Mr. Zur, a registered metallurgical engineer, was Chief Engineer of Trauwood from 1936 to 1951, when he joined the **Lee Wilson Contracting Company** as Production Manager. He has been closely associated with wire and strip heat treating, cleaning, coating and handling operations since 1935.

★ ★ ★

The Trauwood Engineering Company are designers and manufacturers of continuous electric patenting, tempering and annealing equipment for wire and strip, of galvanizing and tinning equipment, of heavy duty electric units for process heat treating, and of wire and strip handling equipment.

Carboloy Adds Man in Newark Office

Robert M. Pozzo has been named sales representative for **Carboloy Department of General Electric Company,** Detroit. He has joined the Atlantic District headquarters, Newark, N. J. Pozzo was graduated from Colorado School of Mines with a B. S. in metallurgical engineering in May, 1952.

Firth Sterling Honors Employees

At the annual meeting of the Foreman's Club of **Firth Sterling, Inc.,** 158 employees with over twenty-five years service were honored at a dinner held late in March. **Kenneth D. Mann,** President of Firth Sterling, made the honorary awards. Employees with over fifty years service are **Pete Graziano,** and **Ambrose J. Mihlheizler** with fifty-three years service, **Howard C. Kniss,** fifty-one years, and **Donald G. Clark** fifty years.

★ ★ ★

In his address to the Foreman's Club and honored guests, Mr. Mann outlined the Company's progress over the last five years in improving its financial condition, broadening its product line and rehabilitating its productive facilities. "All of these," he said, "tend to enhance job security for the individual employee. However,

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neither the Government nor the Union nor Management can guarantee security, as they may be found only to the extent that the work and efforts of the individuals are combined to insure the success of the Company by whom they are employed."

New Traffic Manager for AS&W

James Ramsey, Jr., has been appointed general traffic manager of **American Steel & Wire,** it was announced by **Walter F. Munford,** president of this division of United States Steel Corporation. Mr. Ramsey succeeds **Robert H. Haley,** whose retirement after 51 years with the Wire Division was announced last week.

★ ★ ★

In taking up his new post, Mr. Ramsey will be responsible for the transportation and dispatching of the Wire Division's millions of tons of incoming raw materials and outgoing finished products in 14 plants, located in nine cities in the northeastern quarter of the United States. Besides using rail, truck and airline facilities, the Wire Division Traffic Department operates the 7500 ton capacity Steamer Clifford F. Hood on the Great Lakes.

Veteran Wire Man Retires

Guy W. Shurmer, retired in March as Division Superintendent of the Wire Mill at the Cuyahoga Works of American Steel and Wire.

★ ★ ★

Born in Warrensville, in 1889, Mr. Shurmer was educated in the primary and high school there. However, he wasn't at that job very long before he became a weigher at the old Newburgh Wire Works in August of 1908. He progressed through a number of positions in that plant becoming foreman in 1926, and general foreman ten years later. In 1943 he was made works superintendent in charge of the Wire Mills in the giant Cuyahoga Works, a position he has held ever since.

★ ★ ★

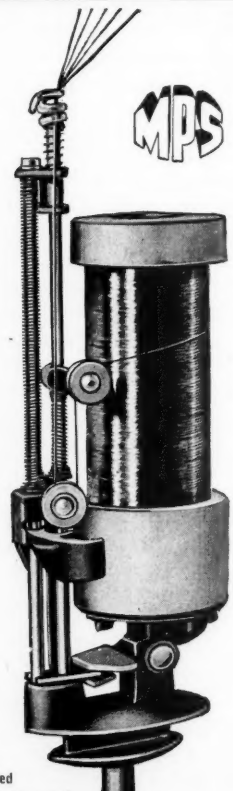
In his private life he has been active in Warrensville Heights, where he formerly was councilman and a member of the zoning commission.

Representatives Appointed by Metal Carbides

The Metal Carbides Corporation, Youngstown, Ohio, announces the appointment of **Sam Ernst** as a Sales Engineer with the Chicago office, 601 N. Milwaukee Avenue; **Joseph R. Weiss, Jr.,** as a Sales Engineer with the Cincinnati office, 720 Main Street; and **William Hudak,** as a Sales Engineer with the Newark, New Jersey office, 166 Bloomfield Avenue.

★ ★ ★

All of the above engineers are experienced in tungsten carbide metallurgy; Mr. Ernst having been associated with International Harvester Company, Mr. Weiss with Allied Abrasives and Tools, Inc., and Mr. Hudak with Doall Company.



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100

Gross Retires from Crucible; Karns Appointed To Take His Place

The retirement of **William D. Gross,** works manager at **Crucible Steel Company of America's** Spaulding Works, in Harrison, N. J., was announced by **R. S. Poister,** vice president of operations. Mr. Gross' retirement is to be effective May 31, 1954.

★ ★ ★

Concurrently, Mr. Poister announced the appointment of **Paul A. Karns,** recently associated with **John A. Roebling's Sons Corporation** at Trenton, N. J., as manufacturing manager, cold rolled products division, to succeed Mr. Gross upon his retirement. Mr. Karns began duties at Spaulding Works on March 15th.

★ ★ ★

Mr. Gross has been associated with Crucible Steel since 1913. He joined the company at its Spaulding and Jennings Works in Jersey City, N. J., as a chemical engineer. In 1923 he was appointed manager of the plant. When Crucible combined the facilities of its Spaulding and Jennings and Atha Works to form the Spaulding Works at Harrison, N. J., in 1948, Mr. Gross was named manager of the new installation. Under his management, the two Crucible divisions at Spaulding—cold rolled specialties and special products—have increased capacities considerably.

★ ★ ★

Mr. Karns has had long experience in steel production. He began his career in 1919 at the Franklin plant of the Cambria Steel Company in Johnstown, Pa. In 1923 he joined the Stanley Works, at Bridgeport, Conn., as chief clerk and was made superintendent of the company's cold rolling mill in 1935. He became associated with the John A. Roebling's Sons Corporation, Trenton, N. J., as superintendent of the flat shop in 1940 and was manufacturing manager of that company's cold rolled products division when he resigned to join Crucible.

★ ★ ★

A native of Johnstown, Pa., Mr. Karns is an active member of the American Iron and Steel Institute. He serves with the Institute's technical committees on cold and hot rolled carbon steel strip, cold rolled spring steel, low carbon steel flat wire, and carbon spring steel flat wire.

Wire Man Becomes Member of Controllers Institute

George C. Simmonds, comptroller of **United Wire & Supply Corporation,** Cranston, R. I., has been elected to membership in the Controllers Institute of America.

★ ★ ★

Established in 1931, the Institute is a non-profit organization of controllers and finance officers from all lines of business—banking, manufacturing, distribution, utilities, transportation, etc. The total membership exceeds 4,200.

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Are you still using costly diamond dust for refinishing your wire drawing dies? Many wire mills are saving money by using NORBIDE Abrasive for ripping or fast stock removal as well as for accurate semi-finishing operations.

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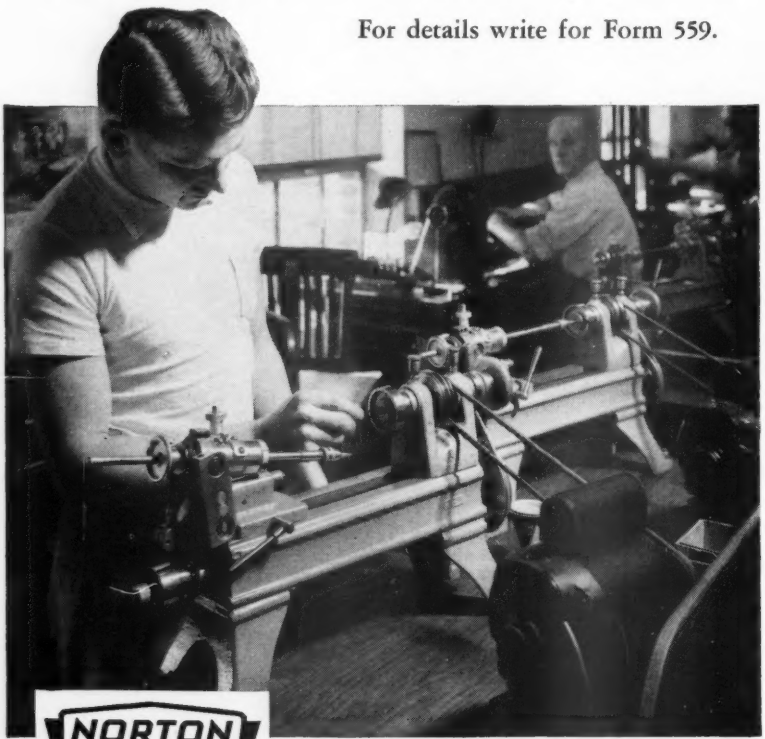

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NORBIDE® . . . *the hardest man-made abrasive*

Hard Surfacing Alloy Concern Elects President

Coast Metals, Inc., of Little Ferry, New Jersey, has announced the election of **George S. Mikhalapov** as President to succeed **John P. Rutherfurd.** The Company is one of the leading manufacturers of hard surfacing alloys and a pioneer in the development of wear resistant castings.

★ ★ ★

Mr. Mikhalapov started his career with Stone & Webster upon graduation from M.I.T. in 1926, working on the design and construction of central power stations and industrial plants. While Director of Research and Development for Taylor-Winfield Corporation in Warren, Ohio, prior to World War II, he developed a series of resistance welders which were used extensively to spotweld aluminum alloys for wartime aircraft production.

★ ★ ★

Mr. Mikhalapov is a member of the American Society of Mechanical Engineers, the American Society of Testing Materials, and in 1947 he presented the Adams lecture to the American Welding Society. He holds a number of patents mainly for the development of electrical equipment and welding and metalworking processes.

★ ★ ★

Coast Metals, Inc., organized in 1937, manufactures a complete line of hard surfacing alloys, and prior to World War II pioneered the use of these alloys in cast and machined form for the manufacture of integral parts of industrial equipment exposed to extreme wear and heat. In 1950 the company moved to Little Ferry, New Jersey, building a new plant to house its main office, research and production.

Anaconda W & C Announces Sales Personnel Changes

Jack Saunders has been made manager of a new Anaconda sales district to include all of the State of Florida, in one of several important sales assignments made recently by **Anaconda Wire & Cable Co.**, New York, N. Y. The new district sales office will be located in Tampa, and **Robert W. Carmichael** has been named to work with Mr. Saunders in the new location.

★ ★ ★

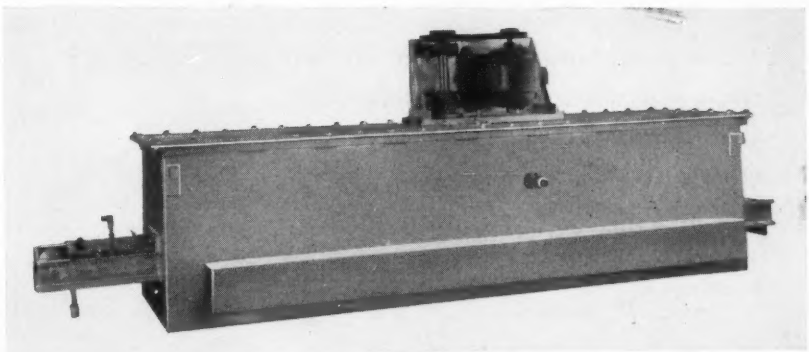
Frank D. Dickey has been appointed manager of the San Francisco district. He succeeds **Lee Hayward,** who has resigned. Mr. Dickey will be assisted by **Dick Riley,** who has been transferred from the Cincinnati district to the San Francisco district.

★ ★ ★

Other changes include assignment of **Howard Davies** as salesman for the district office in Pittsburgh; and **Thomas F. Jackson's** appointment to the Chicago district office.

Complete Processing Equipment for Magnet Wire

ENAMELING • TINNING
GLASS COATING • SYNTHETIC COATINGS



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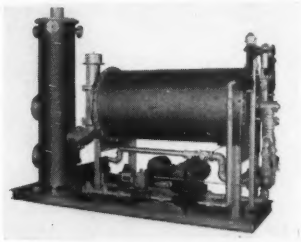

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Sales Representatives in Principal Cities

Bridgeport Brass Named New Reynolds Distributor

Appointment of **Bridgeport Brass Company,** 1921 East 119th Street, Cleveland 6, Ohio as a distributor of Reynolds Aluminum has been announced by **Reynolds Metals Company** from its General Sales Office in Louisville, Kentucky. Bridgeport Brass will stock aluminum wire, rod and bar in standard alloys and sizes in its Cleveland warehouse.

★ ★ ★

Bridgeport Brass Company is completely equipped to provide prompt service on these items. The new appointment will increase the availability of aluminum screw machine products in the Cleveland area.

Carboloy Adds Man at Philadelphia

Robert Drake has joined **Carboloy Department of General Electric Company,** Detroit, as a field sales representative for the organization's Atlantic District. He will be attached to the Philadelphia sales headquarters.

★ ★ ★

Mr. Drake, formerly with Thompson Aircraft Co. and Eaton Mfg. Co., both in Cleveland, graduated from Cornell University, Ithaca, N. Y. with a bachelor's degree in mechanical engineering in 1953.

Harry A. Leigh

Harry A. Leigh, 68, executive vice president, treasurer and director of the Seymour Manufacturing Company, Seymour, Conn., died unexpectedly on March 28th in St. Petersburg, Fla. of a heart ailment.

★ ★ ★

Mr. Leigh was born in Fallsington, Pa. on January 27, 1886, son of the late Henry and Susanne Smith Leigh. He came to Seymour in 1912 and has since been identified with the Seymour Manufacturing Company.

★ ★ ★

In addition to his executive affiliations with the Seymour Company, Mr. Leigh was treasurer of the Baltiscan Company, president, treasurer and director of the American Refractories & Crucible Corporation, North Haven; assistant treasurer and director of the H. A. Matthews Company, vice president, treasurer and director of the Phospher Bronze Corporation; and secretary, assistant treasurer and director of the Seymour Trust Company.

Acheson Appoints Service Engineer

Acheson Colloids Company, Port Huron, Michigan, has announced the appointment of **Clifford T. Olsen** as Service Engineer. Following a tour of duty with the U. S. Navy in the European and Pacific theaters, Mr. Olsen was graduated from Lafayette College in 1950 with a Bachelor of Science degree in Metallurgical Engineering. Prior to his association with Acheson, Mr. Olsen was employed by Hanson-Van Winkle-Munning Co., and Automotive Rubber Co., as electrochemist and sales engineer, respectively.

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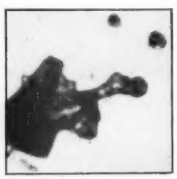

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Julian Schueler Retires

Ralph K. Clifford, President of Continental Steel Corporation, Kokomo, Indiana has announced several changes in personnel in the operating departments effective April 1. These changes are occasioned by the retirement of **Julian L. Schueler** from active duty as general superintendent to a consulting capacity for special assignments.

★ ★ ★

Succeeding Mr. Schueler as general superintendent will be **Arthur L. Miller** who has been assistant to Mr. Schueler since 1947. Mr. Miller is a graduate in mechanical engineering from Purdue University and entered Continental's service in 1933.

★ ★ ★

Donald C. Horsman has been named assistant general superintendent to succeed Mr. Miller. Mr. Horsman received a degree in chemical engineering (metallurgy) from Purdue in 1935 and has been with Continental since that time.

★ ★ ★

Succeeding Mr. Horsman will be **Charles M. Coe,** a chemical engineering graduate from Purdue in 1939, as steel division superintendent. **Herman D. Achors** will succeed Mr. Coe as rod mill superintendent.

Elected Director of International Nickel

Theodore G. Montague, President of the Borden Company, has been elected a director of **The International Nickel Company of Canada, Limited, Dr. John F. Thompson,** Chairman of the Board of Inco, announced.

★ ★ ★

Mr. Montague served as Vice President of The Borden Company, New York, from 1934 to 1937 and has been President since 1937. He is a director of The Borden Company, Ltd. (Canada), Chairman of Drake Bakeries, Inc., a trustee of Bank of New York, a trustee of Northwestern Mutual Life Insurance Co., and a director of the American Sugar Refining Company.

Norton Adds Engineer to Detroit Office

Russell J. O'Neil has been appointed a field engineer by **Norton Company** of Worcester, Mass., effective April 1st. He has been assigned to Norton's Detroit district office.

★ ★ ★

Mr. O'Neil has been with Norton since 1945. He was formerly a group leader at the Detroit office, from 1947 to 1951 when he became a supervisor at the Cleveland office. Since August, 1953, he has been taking the sales training course.

★ ★ ★

A native of Canada, he served five years in the Royal Canadian Air Force during World War II, being released from service as a warrant officer.

THE BEST TESTER . . .

FEATURES:

- Automatic brake on the let-off device by means of hydraulic couplings.
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- Handling up to 24 to 30 inch flange diameters on pay-off and take-up devices.
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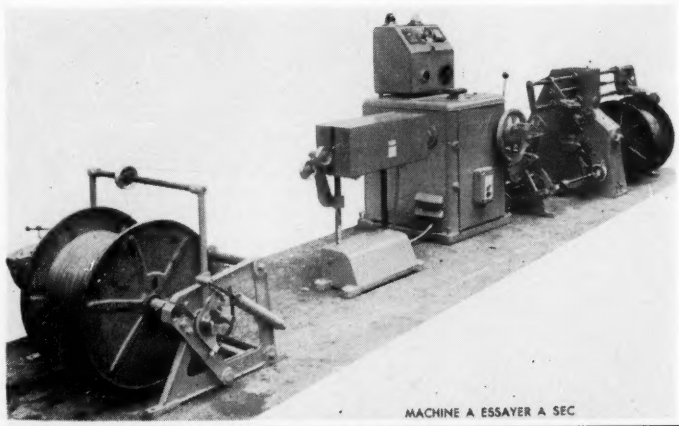
- Single or double take-up.
- Electric counter stopping the machine when a predetermined length is reached.



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- Spark tester with a high voltage, from 3000 to 15000 volts, acting on a lamp, a volt counter and a buzzer.
- Traverse adjustable in speed and in length.
- The main advantage of our Spark Testing Machine is the very slow start (hydraulic couplings) allowing the making of dielectric tests on very fragile cables.

POURTIER MACHINES

153, rue Galliéni, Romainville (Seine)

France

Reliance Promotes Three Men

Announcement of new responsibilities for three of its operating personnel is made by the **Reliance Electric & Engineering Company,** 1088 Ivanhoe Road, Cleveland. **Fred E. Harrell,** vice president, has been given the additional duties of director of special projects, a newly created position in which he will be concerned with new building projects and associated growth problems of the company.

★ ★ ★

Hugh D. Luke, formerly manager of central production planning, becomes manager of manufacturing of rotating equipment, and **Stephen W. Feiss,** formerly a manufacturing staff project engineer, is appointed general superintendent of the company's Ivanhoe Division.

Swift Promotes Three Men

Three key employes of **Swift & Company's** Industrial Oil Department assumed new responsibilities recently, **F. E. Lacey,** manager, announced.

★ ★ ★

Raymond W. Starmann, former assistant sales manager, is now assigned to market development work for the Industrial Oil Department. **Charles C. Caruso,** former raw material buyer for the Industrial Oil and Soap departments at the Hammond Technical Products and Chicago plants, is the new assistant sales manager, and **John F. Deardorff,** former assistant head of the Tallow Sales Department in Chicago, succeeds Mr. Caruso as buyer.

"Switching to NILSON 4 SLIDES Saved us $17,656 on metal alone"
Yes, simply by changing stamping methods, this NILSON Customer profited 4 ways:
1. Production increased 80%.
2. 72% less metal used (per 4 million pieces).
3. Greatly improved quality with minimum of rejects.
4. Strengthened competitive position with greater profit margin.
You, too, can enjoy these advantages in producing your own wire forms and small metal stampings. Parts such as illustrated in the margin were straightened, fed, pierced, blanked, swaged, stamped or coined, cut-off and formed AUTOMATICALLY in NILSON 4 SLIDES in one quick precise operation. ONE Machine. ONE Operator.
NILSON 4 SLIDES available in wide range of sizes: forming Wire up to ½" diam. in feeds to 32" max. and Metal Ribbon stock up to 3½" wide. Press sections 5 to 30 ton capacity. Heavy Duty Types in 50 and 75 ton models.
MODEL S-3-F Nilson 4 Slide with No. 51B Nilson Tilting Stock Reel.
THERE'S NOTHING LIKE A NILSON
Write, Wire, Phone for full particulars.
THE A. H. NILSON MACHINE COMPANY
1516 Railroad Avenue • Bridgeport 5, Connecticut
Automatic Chain-Making Machines • Automatic Staple Forming Machines • Wire and Stock Reels • Foot Presses • Wire Straightening Equipment • Slide Feeds for Presses

Elected Vice President of Pheoll

Cary C. Wilson has been elected vice president-sales, **Pheoll Mfg. Co.,** Chicago, Ill. Formerly with Cinch Mfg. Corp., subsidiary of United-Carr Fastener Corp., he served as vice president and general manager before joining Pheoll in January.

Wickwire Bros.' New Sales Executives

Wickwire Bros. Inc., Cortland, N. Y., have appointed **Charles G. Wickwire Jr.** to vice president-sales, and **Harold W. Ballous** and **Willard F. Potter** as assistant sales managers, and **Winthrop R. Wickwire** as assistant sales manager for manufacturers' wire.

Edward J. Markey

Edward J. Markey, president of the National Annealing Box Company, Washington, Pa., died at his home on March 18, 1954, after an illness of several months. He was 61.

★ ★ ★

The company which he headed at one time made heavy steel castings used to help cool steel. The concern added other products in recent years and manufactures steel pickling, galvanizing and plating tanks.

★ ★ ★

Mr. Markey attended Washington and Jefferson College and Notre Dame University before joining the box company, which was organized by his father.

A Review of Recent Wire Patents

No. 2,670,640, APPARATUS FOR FOLIATING WIRE RIBBON LEADS, patented March 2, 1954 by Paul A. Dell, Highland Heights, Ohio, assignor to General Electric Company, a corporation of New York.

The apparatus comprises a pair of opposed semi-cylinders each having a generally semi-cylindrical axial cavity and a cylindrical roll mounted axially within the cavity, open bearing shoes backing the semi-cylinders and adapted for sliding the shoes one towards the other thereby to squeeze a wire located between the rolls tranversely to their axes, and a device for rocking the semi-cylinders, thereby to draw the wire backwards and forwards between the rolls.

★ ★ ★

No. 2,670,852, FILTER FOR LIQUIDS, patented March 2, 1954 by Eric Brown Davidson, Winchfield, England.

This filter comprises a support in the form of a spiral spring the turns of which are spaced, provided with a sheath, formed from a single wire in the form of a spiral each turn of which extends around two adjacent turns of the spring, the turns of the spiral wire which extend between any three turns of the spiral spring being arranged so as to alternate with one another on the intermediate turn of the three turns, and a filter material enveloping the sheathed exterior of the support.

No. 2,670,936, SINUOUS WIRE ELEMENT AS EXTENDED SURFACE ON UNDULATED HEAT EXCHANGER PLATE WALL, patented March 2, 1954 by Sven Holm and Arthur Jensen, Wellsville, N. Y., assignors to The Air Preheater Corporation, New York, N. Y.

Heat exchange fins are provided, each consisting of an individual metallic wire of uniform cross-section bent in sinusoidal form to provide a number of alternately upright and inverted U-shaped loops.

★ ★ ★

No. 2,671,303, WIRE LAYING MACHINE, patented March 9, 1954 by Thomas H. Pearce, Niles, Mich., assignor to National-Standard Company, Niles, Mich., a corporation of Michigan.

The fifteen claims of this patent are directed to a machine in which a number of wires are laid together, without twisting, to form a strand.

★ ★ ★

No. 2,671,736, METHOD OF PROTECTING NORMALLY CORRODIBLE METALS FROM CORROSION, patented March 9, 1954 by Anton J. Zoeller, West New York, N. J.

A method of protecting a ferrous metal from corrosion is disclosed which comprises preheating the metal to a temperature between 600°F and 1000°F., immersing the heated metal in a molten liquid bath consisting of a petrolatum normally solid at room temperature, having a melting point between 95°F. and 125°F., and having a flash point below 250°F., for a period of between 4 and 7 seconds, then withdrawing the metal from the bath and applying a paint to the pretreated metal without removal of the petrolatum before applying the paint.

★ ★ ★

No. 2,671,737, ALUMINUM COATING PROCESS AND FLUX, patented March 9, 1954 by Walter E. Jominy, Detroit, and John H. Olson, Berkeley, Mich., assignors to Chrysler Corporation, Highland Park, Mich., a corporation of Delaware.

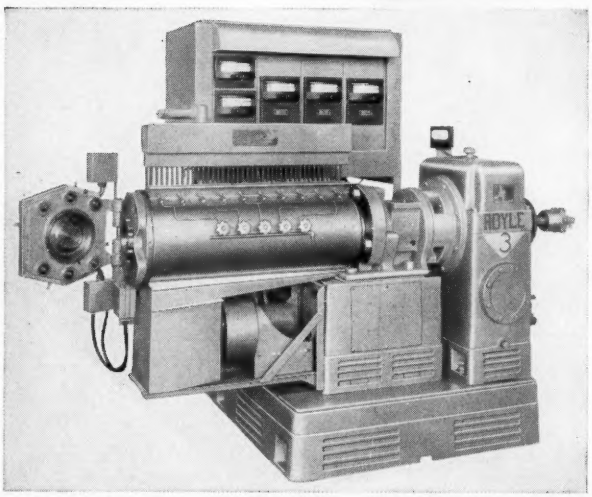
This process is for forming corrosion resisting coatings consisting essentially of aluminum on ferrous metal bodies. There are six claims.

★ ★ ★

No. 2,672,070, WIRE COIL SCREW THREAD INSERT FOR MOLDED MATERIAL, patented March 16, 1954 by John O. Forster, Harrison, N. Y., assignor to Heli-Coil Corporation, Danbury, Conn., a corporation of Delaware.

The convolutions are interlocking and bear tightly on one another so as to form an interior screw thread and outwardly extending projections to anchor

FASTEST HEATING FASTEST COOLING



Here are some of the time-tested, money-saving reasons more and more plants are standardizing with Royle Spirod* Extruders for processes requiring maximum flexibility in controlled temperatures — constantly maintained and accurately zoned:

- **Extra heavy walled cast steel cylinders that will not warp. No joints to leak when pressures are high or crevices to collect burned compound that would cause contamination.**
- **Heavy duty large diameter heating elements, that can be used with 440 volts without step-down transformers, provide radiant heat to cylinders and heads.**
- **Any heating element may be removed and replaced without disturbing other elements or wiring.**
- **A cooling system with ten times the capacity of conventional designs can be modulated through its entire temperature range without drastic changes. Ample cooling for all compounds at maximum speeds.**

No. 3 Royle Spirod Extruder. Completely insulated and equipped for evaporative cooling.

*Patent Applied For

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ROYLE PATERSON N. J.

PIONEERED THE CONTINUOUS EXTRUSION PROCESS IN 1880

London, England — James Day (Machinery) Ltd. — REgent 2430

Home Office — V. M. Hovey J. W. VanRiper — SHerwood 2-8262

Akron, Ohio — J. C. Clinefelter — SWandale 4-5020

Los Angeles, Cal. — H. M. Royal, Inc. — LOgan 3261

PATERSON 3, NEW JERSEY

the coil in the molded material.

★ ★ ★

No. 2,672,194, SUPPORTING MEANS FOR CURTAINS AND THE LIKE, patented March 16, 1954 by Florence F. Loudon, Toronto, Ontario, Canada.

This device is formed of a single length of wire bent to shape.

★ ★ ★

No. 2,672,297, MACHINE FOR WINDING TOROIDAL COILS, patented March 16, 1954 by Donald C. Harder, San Diego, Calif.

Wire may be withdrawn from the bobbin during operation of the machine without requiring the wire to accelerate anything but its own weight.

★ ★ ★

No. 2,672,298, MACHINE FOR WINDING COILS, patented March 16, 1954 by James E. Bancroft, Jamaicam, N. Y., assignor to Allied Control Company, Inc., New York, N. Y., a corporation of New York.

The inventor provides a new traverse mechanism for the precision winding of successive layers of spirally wound wire of different overall sizes of coils.

★ ★ ★

No. 2,673,045, PAY-OFF REEL, patented March 23, 1954 by Wilder P. Lewis, East Haven, Conn., assignor to United States Steel Corporation, a corporation of New Jersey.

It is stated that the reel is adapted to handle large coils of wire and at high speeds.

★ ★ ★

No. 2,673,046, APPARATUS FOR UNCOILING WIRE, patented March 23, 1954 by Wilder P. Lewis, East Haven, Conn., assignor to United States Steel Corporation, a corporation of New Jersey.

This is a division of the application for patent which resulted in the grant of No. 2,673,045 and is related thereto. Four claims.

★ ★ ★

No. 2,673,072, WIRE FENCE, patented March 23, 1954 by Bert A. Quinn, St. Paul, Minn.

The fence is of wire and of the type where some of the wire members are adapted to be inserted into the ground.

★ ★ ★

The information in this section is furnished by the patent law offices of LANCASTER, ALLWINE & ROMMEL, 438 Bowen Bldg., Washington 5, D. C. Data listed is only a brief review of recently issued patents obtained by various U. S. Pat. Off. registered attorney for manufacturers and/or inventors. Complete copies may be obtained direct from Lancaster, Allwine & Rommel by sending 50¢ for each patent desired. Outside of the U. S. and Canada the cost is $1.00 for each copy.

No. 2,673,578, MACHINE FOR MAKING BARBED WIRE, patented March 30, 1954 by John B. Getz, Morton, Ill., assignor to Interlocking Fence Company, Morton, Ill., a corporation of Illinois.

Included are a pair of tubular guide blocks on opposite sides of a twister head and each having spaced apart arcuate face portions, and a cutter blade having an arcuate cutting edge complementary to the arcuate face portions and slidable thereon to cut the barb-forming wire, the arcuate face portions and the complementary shaped cutter blade coacting to assist in guiding the cutter blade through its cutting stroke and minimizing burring of the barb-forming wire.

★ ★ ★

No. 2,673,598, SPRING FOR PRODUCING SOFT EDGES FOR SINUOUS SPRINGS, patented March 30, 1954 by George H. Grattan, Van Dyke, Mich., assignor to No-Sag Spring Company, Warren Township, Mich., a corporation of Michigan.

A spring element is disclosed made of wire bent back and forth to provide adjacent oppositely presenting loops joined by straight portions and comprising a load-supporting portion, a reversely bent portion containing two loops with the adjacent loops of the load supporting and reversely bent portions forming an aperture for receiving a U-shaped member on which the element is supported, and a downwardly extending end on the reversely bent portion disposable within the U-portion of the

CAMDEN WIRE CO., INC.

Wire Fabricators

MANUFACTURERS OF BARE, TINNED AND SILVER PLATED STRANDED COPPER WIRE, CONCENTRIC OR BUNCHED

40 Masonic Avenue • Camden, New York

member by which the spring element is anchored in position thereon when deflected downwardly thereagainst.

★ ★ ★

No. 2,673,820, TREATMENT OF HOT METAL RODS, patented March 30, 1954 by Myles Morgan, Worcester, Mass., assignor to Morgan Construction Company, Worcester, Mass., a corporation of Massachusetts.

The method of treating a hot ferrous metal rod above the critical temperature is contained in this patent comprising bending the rod into a series of generally circular convolutions which are loosely intermingled to form a permeable annular bundle, adding convolutions in the direction of the axis so that the bundle gradually increases in size in a direction parallel with its axis, and causing relatively cool air to flow upwardly through the space in the center of the bundle and then downwardly through the convolutions of the bundle, while it is being formed, in a direction generally opposed to that in which the increase in size is taking place.

New Wire Enameling Machine Introduced

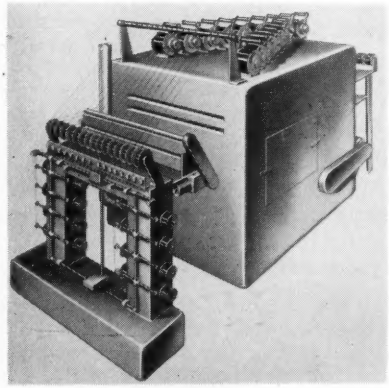
Michigan Oven Company, 415 Brainard, Detroit, introduces a new horizontal fine wire enameling machine, incorporating many unique features. Its high operating efficiency promotes production of high-grade enameled wire at low cost.

★ ★ ★

The machine, which is of compact design, occupies little floor space. A significant feature is the machine's ideal height which permits access to all attention points without climbing or stooping.

★ ★ ★

Extreme temperature uniformity is effected in the oven by forced convection heating. High operating speeds at relatively low temperatures and fuel consumption are claimed and a variety of insulating materials may be accommodated.



New Wire Enameling Machine. * * * * * *

★ ★ ★

The machine is competitively priced and is available for gas or electric heating.

New Portable Carton Closer

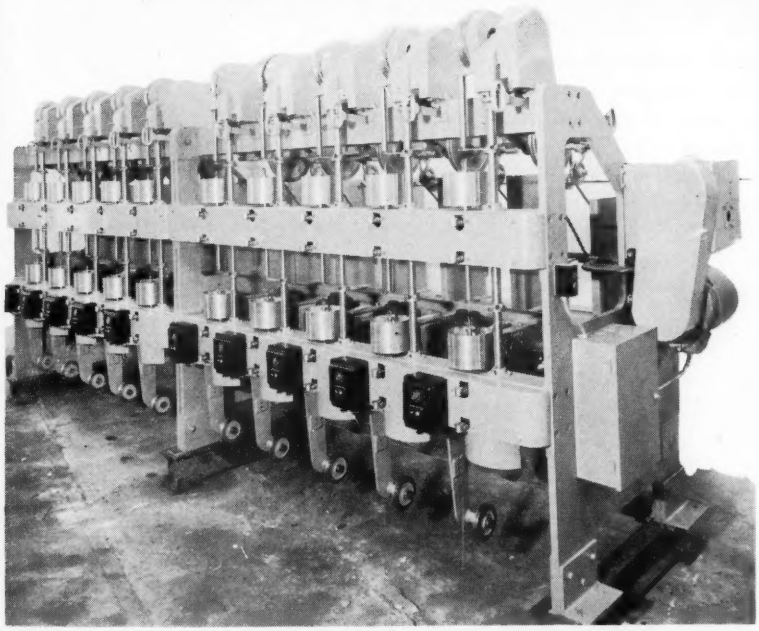
International Staple and Machine Company, 809 East Herrin Street, Herrin, Illinois announces availability of a new, improved, cast aluminum, portable "Boxer" model. Dimensions are 16½" x 7" x 4¼". The entire unit weighs only 5 lbs. 5 ozs.

★ ★ ★

Like all International Staplers, the "Boxer" operates on the retractable anvil principle, that permits stapling from the outside **after** the carton is filled.

★ ★ ★

2D-10-MBB INSULATION WINDING MACHINE No. 1129



APPLIES DOUBLE COVER TO 10 LINES OF WIRE SIMULTANEOUSLY. NOMINAL WIRE RANGE #15 TO #25 B&S GAUGE (.057" TO .018" or 1.450MM TO .455MM). STANDARD CAPSTANS 8" DIAMETER. SUPPLY WIRE LETOFFS AND TAKE-UPS ARE AT REAR OF MACHINE NOT SHOWN. MACHINE CAN BE ARRANGED SPECIAL WITH 12" DIAMETER CAPSTANS FOR HEAVIER WIRES.

EST. 1855 AIMco INC. 1915

"American" AIM INSULATING MACHINERY COMPANY

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FAIRHILL AND HUNTINGDON STREETS

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THE NEW CRUM CALCULATOR
FOR WIRE DRAFTING

FEATURES

- Provides quicker and more accurate information on die sizes and reduction areas.
- Has new scale for more accurate determination of small percentages.
- Gives readings in B & S gauges.
- Intermediate lines provide reductions for 16 holes in one setting.
- New rectangular shaped back for better protection of calculator.
- More legible % draft-per-hole scale.
- Calculates wire production rates for various speeds and efficiencies.
- Vinyl plastic construction, resistant to wear, warping, dirt, perspiration, wire drawing soaps—can be cleaned.
- Still fits your vest pocket.
- Handy tables of W & M and B & S gauges.
- Feet per pound calculating scale for steel, copper and aluminum wires.
- Durable, accurate, easy to use.

The improved Crum Calculator is worth its weight in gold in time saving —no laborious mathematical calculations necessary when you use it. Instruction sheet with examples accompany each Calculator. You should have one or more in your wire drawing department. Price: $5.00 each.

Send your orders to:

WIRE AND WIRE PRODUCTS

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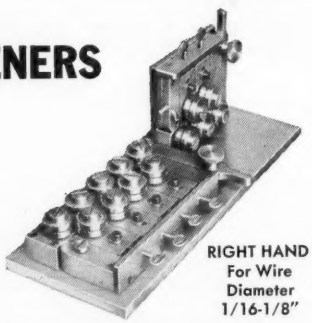
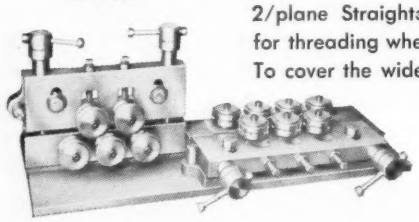
Sjogren 2 PLANE ROLL STRAIGHTENERS



RIGHT HAND
For Wire
Diameter
1/16-1/8"

Sjogren Two Plane Roll Straighteners are fully ball bearing for heavy production duty. They are designed to accommodate all sizes and grades of round or shaped wire whether it be high carbon, low carbon or copper, as well as the many alloys, from .010" to .375". Once set for the job at hand Sjogren 2/plane Straighteners may be opened and closed for threading when making coil changes without effecting the adjustment of the setting. To cover the wide range of wire diameters there are several size groups manufactured with either left or right hand direction. Each is individually produced to exact specifications for the grade, size and type of wire to be processed. Sjogren Two Plane Roll Straighteners do their duty each day, every day in the year.

LEFT HAND
For Wire Diameter
3/16-3/8"



Used by Wire Men Who Want the Best!

SINCE S&S 1927

WIRE PULLERS • WEDGE GRIPS • JAWS FOR ALL MAKES OF PULLERS AND TESTING MACHINES • CAGE ROLLERS • SWAGING HAMMERS • POINTING DIES • WIRE SPOOLERS

SJOGREN TOOL AND MACHINE CO., INC.
Tools for The Wire Industries
14 SWORD STREET, AUBURN, MASSACHUSETTS

The "Boxer" meets Consolidated Freight Classification Rule #41 requirements as well as Post Office and overseas closing standards. It is recommended for small volume shippers, for odd job carton closing in large shipping departments, and for retail use.

★ ★ ★

The manufacturer reports that products now packaged by this improved model include instruments, furnace parts and hardware, etc.

"First Ironworks" to Be Dedicated in September

The reconstruction of America's "first successful ironworks," according to present plans, will be formally dedicated at Saugus, Massachusetts, in September.

★ ★ ★

Members of **American Iron and Steel Institute** and of the **First Iron Works Association,** jointly responsible for promoting the restoration, will share in the opening day of ceremonies. The second day will feature the public dedication.

★ ★ ★

The restored works will include the furnace, forge, slitting mill, warehouse and wharf. The ironmaster's house was restored previously.

★ ★ ★

Originally built in 1645-1646, the pioneer ironworks operated for about 30 years before it was abandoned. Reconstruction was started by the Institute in 1948.

Rods for Nails

The principal product of the slitting mill was rod iron for making nails. The mill received bar iron from the chafery forges, normally about three inches wide and 1½ inches thick. These were cut cold into 2 or 3 foot lengths and were heated in a wood fired reverberatory furnace for several hours. They were then rolled into flats about 5 inches wide by ¼ inch thick and 8 to 10 feet long. Most of the flats then went to the slitting mill where rotating-disc cutters sliced them into finished rods. These were then bundled and sold to nailmakers.

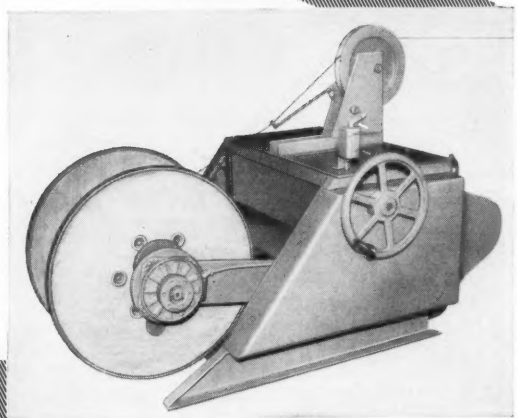
★ ★ ★

Experts are also surprised at the type of rolling and slitting mill that was erected at Saugus. It utilized the principle of indirect power, seldom found in contemporary mills, or even in those of considerably later date. The rolling and slitting of iron requires the turning of a pair of shafts or spindles in opposite directions and at the same rate of speed. This might have been accomplished by putting water wheels on either side of the mill building set so that they would turn in opposite directions, one directly over the other. However, research shows that both of the 17-foot water wheels at Saugus were on the same side of the building. This means that one wheel drove one shaft directly, while the second wheel turned a cog wheel shaft so geared as to reverse the rotation of the second set of rolls.

★ ★ ★

WIM Shaftless Payoff Stand

The WIM Shaftless Adjustable Tension Payoff Stand is one example of the conservative design and precision engineering in WIM wire handling equipment. Here is a smooth handling, high speed machine featuring operating simplicity and dependable performance. Let our engineers, with their successful experience in wire handling, help you with your problems. Write today for further information.



WIM Shaftless Adjustable Tension Payoff Stand

WIRE INSULATING MACHINERY, INC.

Division of Machinery Electrification, Inc.

Northboro Mass., U.S.A.

Nails were an essential commodity in early New England, and most of them had to be brought from the mother country at great cost in time and money. The slitting mill at Saugus was a bold attempt to meet the problem at home and reduce the infant community's dependence on imports.

★ ★ ★

This restoration of the first complete and successful iron works is a mecca to which all persons interested in Steel Americana should repair. Although not yet dedicated it is now open to visitors.

Folder Describes Bunching and Stranding Equipment

Haskell-Dawes Machine Co., Inc., 2231 E. Ontario St., Philadelphia 34, Pa., has issued a 4-page illustrated folder describing their twisters, bunchers, layers, stranders, binders and creels for the forming of rope and cable.

★ ★ ★

The company, which has been producing specialized equipment for 80 years, will be glad to mail a copy of this folder upon request.

New Caliper and Height Gage Announced

A radically new Mauser combination Vernier Caliper and Height Gage for toolmakers and mechanics is announced by the **George Scherr Co.,** 200 Lafayette St., New York 12, N. Y. This model, the "Microlock," features an entirely new design, combining the time-saving advantages of quick-adjustment and rigid tightness of the slide, with a micromatic fine adjustment mechanism. Omitting the commonly used separate Fine Adjustment Slide results in approximately one inch increase of measuring capacity.

★ ★ ★

The "Microlock" fine adjustment feature makes this caliper ideal for use as a height gage. This is accomplished by adding a sturdy base and an ingeniously designed scribing attachment with adjustable scriber. The scriber can be lowered right to the surface plate, so that marking and reading can start from the bottom with the vernier scale set to zero. This results in increased accuracy and considerable saving in time.

★ ★ ★

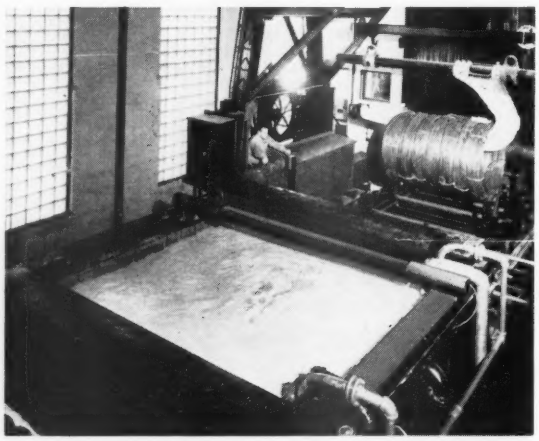
Using the caliper separately enables the taking of outside, inside and depth dimensions, as well as root measurements of threads, gears, grooves, etc. The hardened knife edge points permit layout, spotting and scribing work to accurate dimensions to become simple operations. The upper scale of the vernier is graduated into fractions of an inch with 1/128″ vernier; the lower scale is divided into .025″ with vernier reading of 1/1000″.

★ ★ ★

A vernier 1.225″ long, divided into 25 lines, extends over 49 graduations of .025″ each on the main scale. This makes the difference between division of vernier and main scale large enough to read 1/1000″ with the naked eye. Material used is a high chrome steel with sufficient chrome content to make the tool resistant to rust and stains under normal use; although not fully stainless steel.

★ ★ ★

To INCREASE Your Pickling Tonnage . . .
. . . Use HEIL Steam Jet Agitators



A typical wire mill pickler completely outfitted with HEIL E-3 Type Steam Jet Agitators.

The majority of pickling operations throughout this country and Canada have selected Heil Steam Jet Agitators to increase pickling production at lower cost per ton. Violent agitation and proper heating of pickling solution in one simple operation will save valuable time and money.

1. LONGER SERVICE LIFE The combination of special lead alloy and patented nozzle provides rugged construction for longer service life. No breakage from thermal shock.
2. LOWER INITIAL COST Standard Pre-engineered units are available to meet your specific requirements. No down-time necessary for installation.
3. CHOICE OF MATERIALS Standard units are available in either lead alloy for sulphuric acid or impervious graphite for muriatic and mixed acid solutions.
4. YOU SAVE ACID Uniform agitation at higher obtainable temperatures allows you to pickle at lower concentration and thus stretch your acid consumption.

External Shell and Tube Exchangers available for continuous pickling.

Write for illustrated literature and Bulletin No. 43-W.

CHEMICAL-PROOF LININGS · TANKS HEATERS PLASTICS

Representatives in all Principal Cities

HEIL PROCESS EQUIPMENT CORPORATION
12901 Elmwood Avenue • Cleveland 11, Ohio

Other Heil Products: Pickling Tanks • Lined Fume Removal Systems
Acid-Proof Maintenance Materials • Syphons • Lined Acid-Proof Piping

An open slide permits view of entire scale resulting in faster reading and avoiding of errors. The 6″ capacity "Microlock" vernier with height gage attachment is priced at $33.50. Vernier caliper may be bought separately. Illustrated circular may be obtained from the company.

Reinforcing Asphaltic Concrete with Rolls of Fabric

The Texas Highway Department's Beaumont District has pioneered a new technique of reinforcing asphaltic concrete by using welded wire fabric in rolls, rather than in sheets, in the resurfacing early this year of a busy five mile stretch of road between Beaumont and Port Arthur. Prior to this, except for a one mile test application earlier in Texas and a specialized joint application at the Indianapolis, Ind., Airport, rolls of fabric had not been employed successfully in reinforcing bituminous resurfacing, especially over long stretches.

★ ★ ★

The Beaumont District officials, leaders since 1945 in steel fabric reinforcement of asphaltic concrete topping, first widened to 24 feet the existing 20 foot portland cement concrete pavement which had cracks and open joints. Across the entire width, was machine-laid a leveling course about one inch thick, weighing 100 pounds per square yard.

★ ★ ★

The fabric, 6 x 6-10/10, was laid directly on the leveling course, which was tack-coated, and, using an Adnun finisher, covered with three courses of hot mix, totaling 290 pounds per square yard, and aggregating three inches in thickness. Tack coating was used between each course of the hot mix.

★ ★ ★

At the start of the operation, the end of the first 300 foot long, 11½ foot wide roll of fabric was interlaced with a ⅜ inch round rod. This rod was then dropped behind four or five short steel pegs which had been drilled into the existing concrete pavement on a line transversely across the lane. Next, the fabric was unrolled its entire length and straightened out on the pavement by tension.

★ ★ ★

Having devised a means of keeping the fabric flat on the pavement, the contractors felt that the use of steel plates, sleds, or "hold-down" devices such as were used with the paving machines in other jobs in Texas and elsewhere would be unnecessary.

★ ★ ★

After paving the first quarter of a mile of the project, however, it was found that some springy areas developed under traffic, caused by localized waviness and bulges of the fabric which occurred despite the roll-tensioning device. It was necessary to go back over the section paved and clip some of the wires in order to reduce this springiness.

★ ★ ★

Accordingly, the Beaumont District engineers and the contractors concluded that some sort of hold-down device was needed, after all, to minimize the effect of localized

WIRE SPOOLS, ALL-STEEL, LITHOGRAPHED

Ends and traverses may be shipped separately and assembled easily in your plant on a hand, foot, or power press.
5" and 6½" diameter ends with 1-15/16" diameter traverses.
10½" diameter ends with 3½" diameter traverses.
Traverse lengths up to 12".

J. L. CLARK MANUFACTURING CO.
600 23rd AVENUE • ROCKFORD, ILLINOIS

bulges in the fabric. A steel plate 12 feet long, four or five inches wide, and about an inch thick, was suspended by chains, transversely under the Adnun paver just ahead of the spreader. This plate, beveled on the front and ends, slid along the fabric and "ironed" out the bumps and waviness which had caused the difficulty in the first quarter-mile.

★ ★ ★

The Wire Reinforcement Institute, which headquarters in the National Press Building, Washington, D. C., makes available to interested persons further information on this and other Texas jobs and other uses of fabric in asphaltic concrete elsewhere in the country.

New Glass-Braided Lead Wire With Teflon Insulation

Glass-braided lead wire for electronic and electrical components operating at temperatures from —55° to +200°C is available. Marketed under the trade-name TEMPCLAD the new construction is made by **Hitemp Wires Inc.**

★ ★ ★

The primary conductor insulation is Teflon, which exhibits excellent dielectric strength, low power factor, high insulation resistance and a low dielectric constant. The insulation remains unaffected by temperature cycling and, is inert to all known commercial solvents. The secondary insulation of glass braid, also Teflon-impregnated, affords unusual resistance to abrasion. Since the braiding is non-flammable, it serves as an additional barrier against heat.

★ ★ ★

TEMPCLAD lead wire is suitable for use with equipment working at AC potentials to 600V rms, in aircraft and other severe applications. It is a stranded construction, manufactured in sizes 28 AWG to 10 AWG inclusive, in any one of eight solid colors or with special tracer colors.

★ ★ ★

Inquiries for more information should be addressed to Hitemp Wires Inc., 26 Windsor Ave., Mineola, L. I.

Improved Di-Profiler Rocks as it Hones or Files

A clamp, positioned and tightened by means of a thumb-screw, permits the hone or file of the improved Di-Profiler to be rocked or rotated to conform with the contour of the die or part being worked. A regulated reciprocating stroke of from 0" to ¼" can be operated at any desired speed from 0 to 15000 strokes per minute by a foot control.

★ ★ ★

The rocking feature and the stroke control make this multiple purpose precision machine for tool makers a high production substitute for the old hand method of die filing and finishing. Practically vibrationless and effortless due to the precision construction, this tool is claimed to speed up die work by as much as 50 times, where such work requires an extreme amount of "elbow grease."

★ ★ ★

A spring compensator allows for human errors when a longer stroke

Standardize on ACROPAK* Spools!

Only ½ the Weight!

YET STRONG, TOUGH, RIGID . . *LONGER LIFE*

ACROPAK Spools will help you cut wire packaging costs because they give longer service, require less maintenance and cost less to ship. They're strong. They'll take repeated shippings and still run true on the arbor. They're machined to close tolerances. You can run them at high production speeds with fewer snags, less toe-out and minimum end breakage.

THEY CUT YOUR SPOOLING COSTS

Best proof of ACROPAK superior performance are the millions of these spools now used by the biggest names in the wire industry. We've proved it to them—let us prove it to YOU.

Light Weight
Precision built
Reduced cost
Longer life
Extra strength
Dynamic balance
Greater production
Low cost reconditioning
Less maintenance
Attractive packaging

★ We also make a complete line of heavy-duty shop processing STEEL SPOOLS built to the same high standards of accuracy and rigidity as the famous Acropak aluminum spools.

ACROMETAL PRODUCTS INC.
Division U S Bobbin and Shuttle Co., 616 Fifth Street N., Minneapolis 1, Minn.

than needed is being used or when dead end holes are being filed. Stroke adjustments are simply made by removing the cap and turning the calibrated adjustment screw to the precise stroke desired. Adjustments are so accurate that the Di-Profiler can be used as a lathe or drill press accessory when the extension shaft is assembled.

★ ★ ★

The improved Di-Profiler is furnished with a variety of files, scrapers, hones, stones, burs, reamers, millers, laps, saws, knives, grinders, carbide and diamond tools that completely cover the need of the tool and die maker, so that he can give his full time to production work the modern easy way.

★ ★ ★

Full details will be furnished upon application to Nord International Corp., 449-246 Central Avenue, Orange, N. J.

New Motor Frame Standards Chart

A drastic change in any set of standards, such as the recent change in a-c. motor frame assignment standards set by NEMA, frequently results in confusion.

★ ★ ★

To dispel any possible confusion over old and new mounting dimensions, **Reliance Electric & Engineering Company** has produced the "Compar-A-Frame" chart to aid engineers and designers in quickly comparing the old and new NEMA a-c. frame assignment standards. It is expected that it will be especially useful during the interim period when both motor lines are still available for industrial use. The chart serves both as a tool for design and layout of new machinery, and as a handy reference for sales personnel who require a time-saving spot comparison of dimensions.

★ ★ ★

The single page "Compar-A-Frame" shows, at a glance, comparative dimensions of open type and fan-cooled type polyphase induction motors. There are subcharts for comparing frame sizes according to horsepower and speed, and a chart for comparison of dimensions of the old and new frames. For quick reference there are two simplified motor outlines to give essential dimensions key to letters.

★ ★ ★

The "Compar-A-Frame" chart is printed (on one side only) on lightweight cardboard and is punched for insertion in looseleaf binders. Requests for these free charts will be honored by Reliance Electric & Engineering Company, 1088 Ivanhoe Road, Cleveland 10, Ohio.

Hazard Insulated Wire To Modernize Plant

A modernization program entailing expenditure of more than $300,000 is under way at the **Hazard Insulated Wire Works** plant, a division of the **Okonite Company,** it has been announced.

★ ★ ★

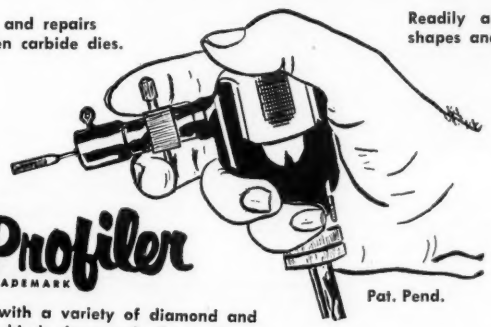
In a joint statement, **David W. Nurse,** vice president in charge of manufacturing of the Okonite Company, and **Albert W. Robertson,** superintendent of the Wilkes-Barre plant, announced most of

DON'T "TIRE OUT" YOUR TOOLMAKERS

Give them precision power hand tools

Makes and repairs tungsten carbide dies.

Readily adapts to special shapes and contours.



SHARPENS
GRINDS
FILES
SCRAPES
HONES
LAPS
SAWS
STONES
CUTS
FINISHES
POLISHES

the * Di-Profiler TRADEMARK

Pat. Pend.

is furnished with a variety of diamond and needle files, chisels, burs and other units of many intricate shapes, thereby reducing the tool and die maker's problem of special tools (made on your time) by 90%.

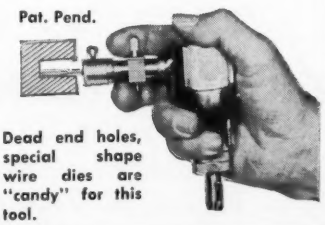
The *Di-Profiler can be used for repairing dies, even without removing from machine. You can hold your files absolutely level for straight holes and provide an oscillating motion for contour. The reciprocating action does the work at a stroke ranging from 0" to ¼", without vibration because of the high precision of the tool. Once you see it—you'll never be without the *Di-Profiler. Write for full details and ask for a demonstration.

SAVE YOUR TOOL MAKERS AND MAINTENANCE MEN BY PROVIDING TOOLS TO DO THE HARD, TIRING PART OF THEIR WORK.

*DI-PROFILER ELIMINATES THE HARD "ELBOW GREASE" WORK.

Everything comes in an attractive mahogany finished box — except the flexible shaft, rotary attachment and motor.

Pat. Pend.



Dead end holes, special shape wire dies are "candy" for this tool.

Nord International Corp.

449-W CENTRAL AVENUE, ORANGE, NEW JERSEY

*An exclusive Nord Trade Mark

the money will be spent for new equipment.

★ ★ ★

The one-third million dollars being spent here is entirely for a modernization program to be completed by late Summer or early Fall. On completion of this program, there is excellent possibility of further allocations being made for additional plant development.

★ ★ ★

As a result of the Okonite Company's modernization program, its position among the top manufacturers of electrical wire and cable will be greatly enhanced. The equipment presently being obtained as part of the $300,000 expenditure program will enable the company to continue to produce Hazard-Okonite cable superior in quality, but at lower costs.

★ ★ ★

One of the biggest single expense items will be for a Robertson Lead Extruder which will be placed in the lead department at a cost of more than $120,000.

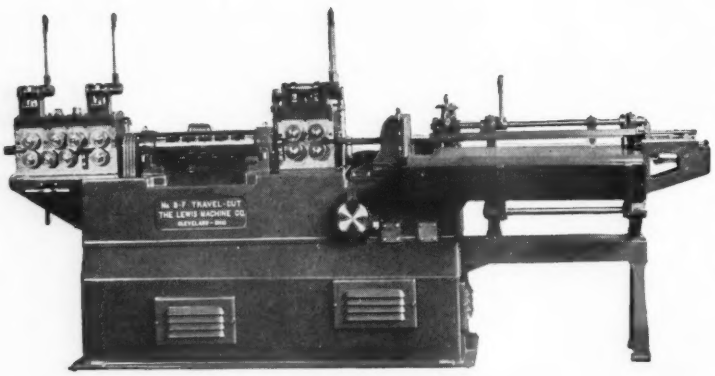
★ ★ ★

Delivery is scheduled the same month for three additional modern Watson Stranding Machines, one already having been installed. The machines cost about $20,000 each.

Fast, Accurate, Economical

STRAIGHTENING and CUTTING

with LEWIS TRAVEL-CUT



22 Models to handle from .012" to ¾" Round, Hex, Flat, Shapes.

Simple in design, rigid in construction, Lewis TRAVEL-CUT will deliver continuous dependable service under the most severe, high production conditions—day in, day out. Feeds wire from the coil, straightens accurately, gauges to uniform length, and cuts clean without stopping the wire. For steel, brass, aluminum and alloy wire. Cut your cutting costs with the Lewis TRAVEL CUT. Full details on request.

Exclusive Representatives

EAST: Penn Machinery Co., 117 North Third Street, Philadelphia 6, Penn.

MIDDLE WEST: Steel & Wire Machinery Co., 15457 Euclid Ave., Cleveland 12, O.

CENTRAL: Moslo Machinery Co., 2443 Prospect Avenue, Cleveland 15, Ohio.

WEST COAST: Hoffman & Heartt, 3065 So. Grand Ave., Los Angeles 7, California.

CANADIAN: Empire Engineering Co., 738 Dundas St., East, Toronto, Ont., Canada

CONTINENTAL EUROPE: Gaston E. Marbaix Ltd., Devonshire House Vicarage Crescent, London S. W. 11, England.

The LEWIS MACHINE Company

3441 E. 76th Street, Cleveland 27, Ohio

Also agents in Paris, Stockholm, Rotterdam, Brussels, Zurich, Milan, Bombay and Melbourne

Tolerance Tables

Under the title "HANDY QUIK-TOLERANCES" **Alexander Michael** has prepared a series of tables most commonly used in industry, together with a new and quick method for learning and memorizing industrial fractions and decimal equivalents without the use of an equivalent chart. The booklet is pocket size, approximately 100 pages, and divided into 3 parts each part being a book in itself.

★ ★ ★

Part 3 is useful for precision work, having over 1000 tolerances arranged for at a glance reading, besides showing how much a part is undersize or oversize without any figuring. Price paper bound $1.00; Leatherette $1.98; Leather bound $2.98.

★ ★ ★

Other books by this author "Handy Tolerance Tables," containing 143 pages of tables, consisting of commonly used fractional dimension tables with decimal equivalents, also 10 thousandths tables. A Visualizer which shows only plus and minus sizes is supplied with both those booklets. Paper bound (pocket size) $1.50.

★ ★ ★

Handy Multiple Lengths with pieces per length, the author's first book, consists of 463 pages of lengths most commonly used in industry and amount of pieces shown for each length. A really useful book for sawing, cutting, and machining. Price $2.00.

★ ★ ★

Copies of these booklets are available by writing Handy Length Book Co., 3507-17th Street, S. W., Canton, Ohio.

Electronic Crane Scale Introduced by P & H

"Hook-a-Weigh" is the name given a new weighing device for overhead cranes now being introduced after five years of research

and development by **Harnischfeger Corporation,** Milwaukee.

★ ★ ★

Offered by the P & H Overhead Crane Division, and proved in service in P & H's own shops for more than three years, this new electronic scale provides accurate weighing service for any type of load while it is being handled, thereby saving time and costs. With the "Hook-a-Weigh," the need for a separate weighing operation in many cases is eliminated, with products moving directly from one phase of production to the next without stopping.

★ ★ ★

The weighing device is extremely simple and efficient. Weight is brought to bear directly upon a load cell built into the load block. An electric signal is transmitted through a cable and a brushless type cable reel to the recording instrument which may be of visual or recording type mounted in the crane cab or other location. The "Hook-a-Weigh" may be used on any crane and is available in capacities up to 200,000 lb. Complete descriptive literature may be had by writing Harnischfeger Corporation, Overhead Crane Division, 4400 W. National Ave., Milwaukee 46, Wis. Ask for Bulletin C-47.

★ ★ ★

New Coating for Corrosion Protection

The Atlas Mineral Products Company, Mertztown, Pa., announces the availability of an elastic maintenance coating for light duty corrosion service. This product, which eliminates compounding on the job, is available as gray or black colors in standard containers. The material, which is sold under the registered trade name of ELPRENE, is based on a joint development by Du Pont and the Atlas Mineral Products Company. ELPRENE is comparable in price to other standard Atlas liquid Neoprene products, such as NEOBON liquid Neoprene coating and NEELIUM standard high solids liquid Neoprene coating.

Electrical Equipment Design for Hazardous Locations

The latest of an annually revised series of 16-page bulletins distributed by **Crouse-Hinds Company** that explain why electrical equipment for hazardous locations is designed and built as it is. This well-illustrated booklet covers explosion pressure dynamics and why explosion-proof lighting fixtures, control boards and receptacles—are necessary for safe operations at Class I (explosive gases or vapors) or Class II (combustible dusts) locations. Request bulletin 2660. Crouse-Hinds Company, Seventh North Street, Syracuse, New York.

Folder Tells How to Attach Sockets to Wire Rope

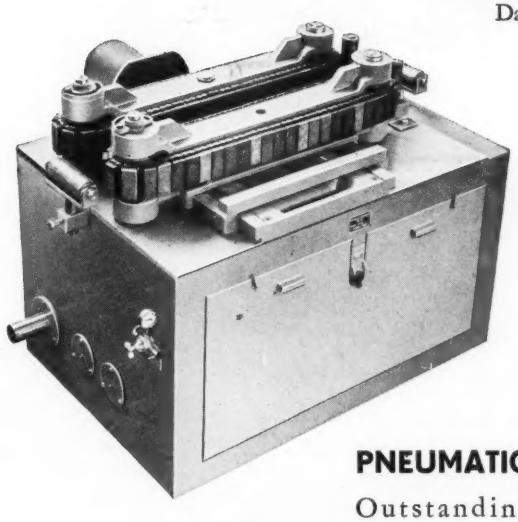
Bethlehem Steel Company has issued a folder that pictures and describes in text the various steps that should be taken to attach a socket to a wire rope.

★ ★ ★

This useful little folder, No. 529-B, may be secured by writing Bethlehem Steel Co., Bethlehem, Pa.

CATERPILLAR DRAW-OFF

No Bending of the Cable.
Very Easy Operation.
Reduced Floor Space.
No Friction; Does Not Damage the Cable.



PNEUMATIC CONTROL

Outstanding Features:

Adjustable Pressure Against the Cable. INDEPENDENT of Cable Diameter ● The Diameter of the Cable can VARY Steadily, without Inconvenience ● Opening and Closing by Finger-Tip Control;

Pat. pend.

MAILLEFER S.A.

RENENS - LAUSANNE (SWITZERLAND)

MACHINERY FOR THE WIRE INDUSTRY

For the U.S.A. enquire to: J. L. Entwistle Company, Providence. R. I.

Announces Top-and-Bottom Carton Stitcher

Packers and shippers will welcome the ingenious new double-duty carton stitcher which has been developed by **The Heller Company** of Cleveland, Ohio, to speed and simplify the metal fastening of many kinds of containers.

★ ★ ★

This new Heller product is actually two machines in one, combining the best features of the company's Top and Bottom Carton Stitchers into an engineered operation designed to save space, time and production costs. Staples come in leg lengths of up to 9/16" and in many colors.

★ ★ ★

The simplified construction of this new Heller Top-and-Bottom Stitcher makes sealing cartons easier and eliminates the costly downtime of more complex machines. It offers shippers a swift method of making their containers strong and secure at a minimum of expense.

★ ★ ★

For details, write The Heller Company, 2159 Superior Ave., Cleveland 14, Ohio.

Thermoplastic
Cable Sheathing Kraft

the patented paper used in

NONMETALLIC SHEATHED CABLE

Is highly water repellent.
Available in all weights
both creped and flat.

Merrimac
Paper Co., Inc.

Mills — Lawrence, Mass.
295 Madison Ave., New York City

Also manufacturers of many tailor-made
Varnishing, Saturating, Tubewinding
and Insulating Papers

Properties of "Mylar" Polyester Film Featured at Radio Engineers Meeting

How properties of "Mylar" polyester film meet requirements in a wide variety of electrical applications was the theme of the Du Pont exhibit at the annual meeting of the **Institute of Radio Engineers** held recently in New York.

★ ★ ★

The exhibit showed "Mylar" to have an unusual balance of electrical, physical, chemical, and thermal properties which make it ideal for many important applications: as a dielectric in dry and liquid-filled capacitors; slot liner and phase insulation in motors; tape insulation for motor and generator field coils; insulation for round and rectangular magnet wire; layer insulation, and insulation between turns in transformer coils; a tough support for mica splittings.

★ ★ ★

"Mylar" has a high dielectric strength (4000 v.p.m.), a good dielectric constant, and high volume and surface resistivity. It has a low power factor, and good insulation resistance. Its high tensile strength (23,500 p.s.i.), a third that of machine steel, permits its manufacture in gauges ranging from a quarter of a mil (0.00025 inch) to 7½ mils (0.0075 inch).

★ ★ ★

"Mylar" also has unusually high impact strength, and long flex life. It retains its properties over a wide temperature range, remaining flexible and stable from —60° to 150° C. It is chemically inert, moisture-insensitive, solvent resistant, and is unaffected by acid and alkalis. Featured in the exhibit were a variety of on-the-market samples of electrical components now using "Mylar" as an insulating material.

New Acrometal Spool Stripper Boon to Wire Mills

Designed to solve the time-consuming problem of clearing snarled wire from spools, this new Acrometal Spool Stripping Fixture will strip wire in one clean cut from any spool of any make in head

sizes from 2½" to 6½" and traverse from 3" to 6".

★ ★ ★

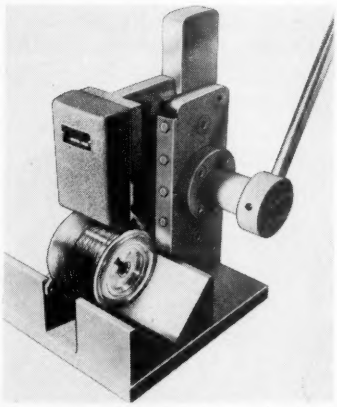
So carefully has the fixture been engineered that, although the leverage is ample to cut through many layers of wire, it will not leave a mar or scar on the spool barrel.

★ ★ ★

The wide range of application to spools of many sizes and makes is especially welcome, since most devices to date have been limited to only a few sizes. If processors employ larger size spools than the dimensions indicated here, a larger fixture is available.

★ ★ ★

Tests prove that this device does the job in less than half the time of hand operation and with complete safety to the polished surface of the spool.



New Acrometal Spool Stripper * * *

★ ★ ★

Acrometal Products, Inc., of Minneapolis, Minn., who have designed and built the device, look upon this stripper as a service to the trade and to their clients. They are producers of the well-known ACROPAKS—precision aluminum and steel spools that are so widely used in the wire industry.

★ ★ ★

Adopting the attitude that what helps the industry will also help them, they decided to see what their engineering department could do about the time loss in stripping spools. The stripper resulting is already filling a long-felt need in many mills.

★ ★ ★

Please write to Acrometal Products at 616 North Fifth St., Minneapolis 1, Minn., for additional information.

"Alloy Steels Pay Off"

A new book of the above title has been published by the **Climax Molybdemun Company,** 500 Fifth Avenue, New York 36, N. Y.

★ ★ ★

In this the company has endeavored to point out the changes that have occurred in economic factors that have made alloy steels more price-worthy and to present case histories of where the adoption of alloy steels have saved money for the producer of finished parts and the user.

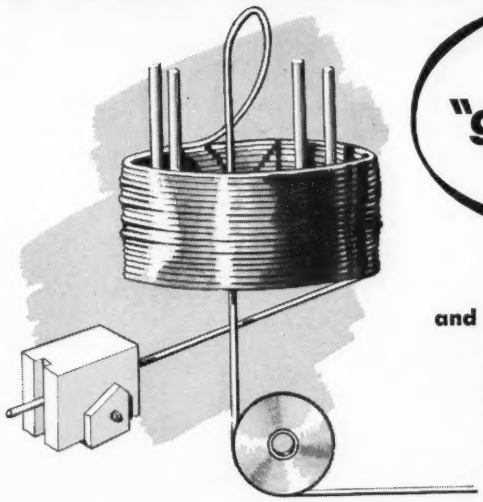
★ ★ ★

No attempt is made to recommend specific alloys for end-uses, but information is concerned with general benefits, such as greater pay load, lower operating costs, longer life, greater safety and less maintenance through the use of appropriate alloys.

★ ★ ★

Copies of the book are available to those who write Climax on their letterheads.

DURPON* DRAWING COMPOUNDS



don't "get tired" easily

Initial performance is high, and they keep it twice as long!

Many soap lubricants for wire-drawing non-ferrous metals work well enough "the first time around." How well they perform when recirculated is another matter—which has a strong influence on the life of your expensive dies.

It's no accident that Nopco Durpon Drawing Compounds have double the effective life of ordinary drawing compounds. They are designed to have just that. A special additive prevents contamination of the effective drawing ingredients by dirt and by metallic particles . . . maintains the normal balance between soap and lubricant during re-circulation.

You gain two important economies from this lengthened stability. Nopco Durpon Drawing Compounds last longer . . . so do your dies.

All three types, Durpon, Durpon L and Durpon FW are natural lubricants; all are on the alkaline side (pH 8.0 to 10.5). Write today for technical bulletins and testing samples.

"stay stable longer"
DURPON
for intermediate wire
DURPON L
for rods, tubes, and heavy wire
DURPON FW
for fine wire

*Reg. U. S. Pat. Off.

NOPCO
CHEMICAL COMPANY, Harrison, N.J.
BOSTON • CHICAGO • CEDARTOWN, GA. • RICHMOND, CAL.

Heanium

Looking for a better material for insulation, the **Heany Industrial Ceramic Corporation,** New Haven 3, Conn., discovered that by using extreme heat and great pressure, they could weld minute particles of aluminum oxide into a finished product suitable for a wide variety of applications. This operation produced a structure that was completely homogeneous and hard as a gem—in fact, a synthetic ruby. By slight variations and additions to the basic materials, it was found that maximum hardness for wear resistant applications in many fields could be obtained.

★ ★ ★

The addition of one ingredient produced its distinguishing red color. Thus was developed what is known as Heanium, a synthetic ruby next to the diamond in hardness. The next step was the fabrication of the synthetic material into a thousand different shapes and forms at attractive and competitive prices.

★ ★ ★

Its qualities of hardness, density and homogeneity introduced into the wire and textile industries a wear resistant material that could outlast steel or porcelain by many times. Heanium compares favorably with carbides, and in the wire industry, it is generally found to be equal and, in some cases, depending on the application, superior to carbides.

★ ★ ★

The important characteristics of Heanium are the following:

Its hard and homogeneous composition insures long and even wear throughout its entire structure. On the Rockwell "C" scale its hardness is 70-74. Its specific gravity is 3.80. It has no surface skin to wear through. The experienced mill man knows that a body with a hard surface and a soft interior, once the hard surface is worn through, results in scratched or broken strands of wire, occasioning stoppage of machines for replacements of guides.

★ ★ ★

Heanium is chemically inert; concentrated acids and alkalies (except fluorine acids) have no effect on it. It is used extensively in the wire industry for tinning and wiping dies.

★ ★ ★

Heanium can be fabricated into wire and textile guides with exceptional dimensional stability, from eyelets with an O.D. of .125" to 5", to forming blocks, pigtails and serrated gear type applicators with tolerances of .005". Slots and holes can be furnished as small as .010". Intricate shapes are now produced in quantity with extreme accuracy.

★ ★ ★

Surface finishes are supplied from a matte or satin finish to a very high polish, which latter increases its diamond-like qualities and decreases static, fraying and metal pick-up.

New Resinous Bonding Cement For Brick and Tile

The Ceilcote Company, 4846 Ridge Ave., Cleveland, Ohio, has announced the availability of a new 4-page illustrated catalog entitled "Corobond . . . An Improved Bonding Cement for Brick and Tile." It contains technical as well as general information on this new acid-proof, alkali-proof and solvent-proof synthetic resinous bonding cement which adds years to the life of brick and tile structures.

★ ★ ★

Of particular interest is the section describing the manner in which Corobond sets. Special additives automatically adjust the speed of initial set to any temperature between 50 and 100° F. In addition to chemicals providing long pot life, Corobond contains a mixture of acid hardners that work on a delayed reaction principle.

★ ★ ★

The catalog contains a chemical resistance chart to serve as a guide to chemical applications. The ability of Corobond resin cement to withstand acids, alkalies, solvents, hot water and live steam makes it suitable for a wide range of such uses. Complete directions for using are given.

★ ★ ★

The Corobond catalog will be sent upon receipt of letterhead request or publication inquiry.

ASA Meeting Dates, 1954

International Electrotechnical Commission, Golden Jubilee Meeting, Philadelphia—University of Pennsylvania, September 1-16. United States member—U. S. National Committee, American Standards Association, 70 East 45th Street, New York 17, N. Y.

★ ★ ★

Fifth National Conference on Standards, sponsored by the American Standards Association (industry, national engineering associations and technical societies, consumer groups)—Hotel Roosevelt, New York City, November 15-17. Query: Public Relations Director, American Standards Association, 70 East 45th Street, New York 17, N. Y.

Stopping Carry-Over of Chrome-Plating Solutions

The routine treatment of chrome-plated parts usually includes a still, cold rinse directly after plating, followed by a cold running water rinse. After this rinse, many platers use a cold spray rinse, but in almost all shops there is a final hot water soak to provide for self-drying of parts and to act as a security operation to insure complete removal of plating solution.

★ ★ ★

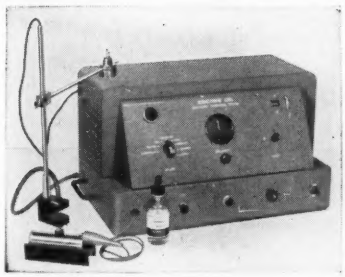
The trouble experienced by many platers was the carry-over of the solution into this final hot rinse tank, in spite of the many rinsings. Many of them have tried synthetic detergents in order to provide wetting action which would insure better rinsing . . . with varying degrees of success, depending on the detergent used.

★ ★ ★

This problem was presented to the **Magnus Chemical Company,** Garwood, N. J., by a number of platers, and experimental work was carried on in the Magnus laboratory. The results of this experimental program clearly indi-

determine WEIGHT... or THICKNESS of coatings on wire...

Make The
KOCOUR ELECTRONIC THICKNESS TESTER



YOUR STANDARD OF QUALITY CONTROL

Presently you are spending many hours of laboratory time using a slow process for determining the weight or thickness of metallic coatings on wire. You can cut this time considerably and save all of the tedious labor. The Kocour Electronic Thickness Tester can do the job quickly and accurately. Operation is simple . . . requires no graphs or standards. GUARANTEED SATISFACTION.

Write Today For Complete Literature
No Cost . . . No Obligation

KOCOUR CO.
4809 S. ST. LOUIS AVE.
CHICAGO 32, ILLINOIS

• See the Electronic Thickness Tester demonstrated at the A.S.T.M. Exhibit in Chicago—Booth 49.

Handwriting of a man about to discover

the secret of cutting, forming, and grinding metals at top rates . . . with fewer rejects and longer tool, die, and abrasive life. You too will benefit from the modern compounds developed by specialists with 23 years of engineering and manufacturing experience. What's more, you'll like the friendly, cooperative approach that Bick engineers take in solving lubricant problems. To get the most out of your machines, always call Hans C. Bick to smooth and cool the way.

Hans C. Bick, INC.

READING, PENNSYLVANIA

cated that Magnus NZ would solve the problem. Subsequent use of this material by many customers in the past few months, as outlined below, has proved that the prevention of carry-over into the final rinse is quite feasible and economical.

★ ★ ★

Magnus NZ is used at a concentration of 16 ounces per gallon of water. Following the cold running water rinse of the plated parts, they are rinsed in a cold still tank containing the NZ solution, after which they are given a cold spray rinse. The work is now ready for the final hot soak. No further trouble with carry-over has been experienced by any of the shops using Magnus NZ in this manner.

★ ★ ★

"A man must either make way for himself or get out of the way of other people."

Silicone Rubber As Cable Insulation

(*Continued from page* 520)

canized silicone rubber tape can be flexed around a mandrel having a diameter twice the cable diameter without damage to the insulation or decrease in dielectric strength.

★ ★ ★

Silicone rubbers can be colored by adding small amounts of inorganic pigments. A wide range of colors are possible. The physical and electrical properties of the stock are not changed appreciably when very low percentages of pigment are added. Colored silicone rubbers are usually required in multiconductor cables for identification purposes.

Special Silicone Rubbers

Fully cured silicone rubbers have higher shrinkage values than organic rubbers. The shrinkage of silicone rubber just after vulcanization is equivalent to that of organic rubbers. The high temperature oven cure generally required in fabricating silicone rubber results in additional shrinkage.

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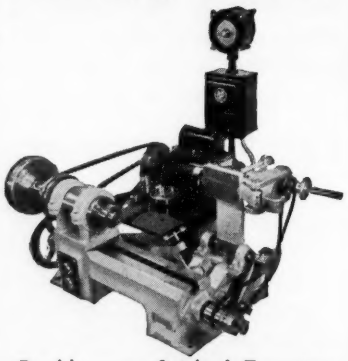

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MIL-W-5086 WAS QUITE A PROBLEM

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MIL-W-5086 is a Military Specification covering aircraft electrical wire. To satisfy it our job was to develop a NELCO cable coating which would have abrasion resistance, fungus resistance, flexibility at temperatures as low as —55 degrees C. and, finally, be resistant to many liquids used in and around aircraft.

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And, of course, the wire manufacturer had to have a cable coating which could be easily applied.

We turned this many sided problem over to our competent laboratory staff.

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The above problem is typical of what our laboratory must face in preparing NELCO cable coatings for every conceivable condition.

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. . . and if you've found something of interest here, we'd like to hear from you.

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Where the shrinkage of silicone rubber after vulcanization may be only 2%, the fully cured silicone rubber part may show total shrinkage as high as 6%. In the fabrication of parts to close tolerances, this presents problems. It means that molds and dies designed for use with organic rubber produce undersized or distorted parts. In the past, molds and dies have been cut especially for silicone rubber. Recent work done on new silicone rubber stocks, however, has reduced over-all shrinkage to 2½ to 3%. This makes it possible in many cases to use these new stocks in molds and dies designed for organic rubber. These stocks are useful for molded cable connector inserts and similar cable terminal and sealing parts.

★ ★ ★

In the past it has been necessary to vulcanize silicone rubber stocks by heating them at 120 to 150 C. Recent work has produced silicone rubber stocks that will vulcanize at room temperatures. This is accomplished by incorporating special vulcanizing agents in the silicone rubber stocks. Two component formulations are made and mixed just before use. Working time is several hours and vulcanizing time is about 24 hours. The mix sets up without porosity. Pastes suitable for caulking and coating, and stocks for calendering and solution coating are available. These room temperature vulcanizing formulations show promise where heat cannot be applied to vulcanize the silicone rubber. Sealing electrical equipment and field repair and splicing of silicone rubber insulated cables are suggested uses.

Fabrication of Silicone Rubber

In general, silicone rubbers designed for extrusion can be handled on conventional rubber or plastic extrusion machines. Extrusion rates comparable to those used for organic rubber compounds can be maintained.

★ ★ ★

The type of feed screw in the extruder is an important factor in

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Greenville, Ohio

determining the extrusion rate and quality of the extruded cable. A single thread diminishing pitch screw is recommended for extruding most silicone rubber. This type of screw is similar to those generally used for extruding plastic covered cable. In a particular test using such a screw with a compression ratio of 2.76 to 1, silicone rubber insulated cable with a wall thickness of 0.060" was extruded at a rate of 400 feet per minute with a screw speed of 35 rpm. Increasing the screw speed to 65 rpm increased the extrusion rate to 700 feet per minute. These extrusions were smooth, uniform and free from porosity.

★ ★ ★

Most silicone rubber will stiffen in storage and must be broken down on a mill prior to extruding. Recent developments in compounding have improved the aging characteristics of silicone rubbers making it much easier to prepare a stock for extrusion.

★ ★ ★

A recent development of interest to cable manufacturers is a method for hot air vulcanizing of extruded silicone rubber. In this process the extruded rubber is passed directly through a tube in which the temperature can be controlled over a range of 300 to 500 C. The proper temperature for a particular extrusion is determined by the length of the tube, the thickness of the extruded part and the extrusion speed. For example, a cable with a wall thickness of 0.030" can be vulcanized in 25 seconds at 350 C. Sections of silicone rubber ⅞" in diameter can be vulcanized in 125 seconds at 350 C. This method is applicable, however, only to certain silicone rubbers. Other silicone rubbers will sponge and blister when placed directly in the very high temperatures required by this process. But, where it can be used, this method of vulcanization eliminates the problems and the high investment associated with continuous steam vulcanizing equipment.

★ ★ ★

It is recommended that after vulcanization silicone rubber be

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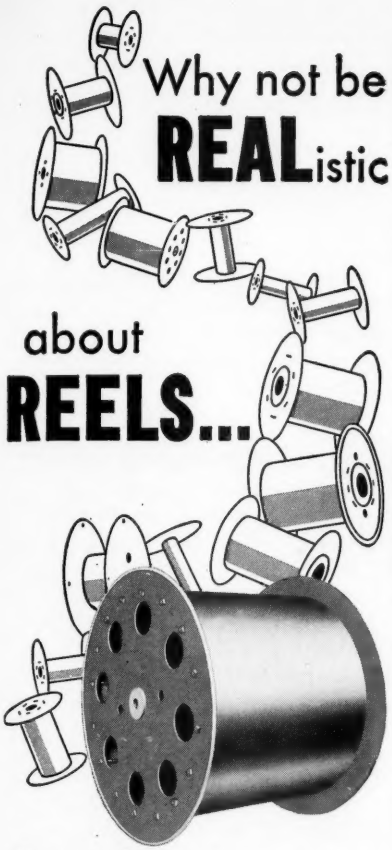

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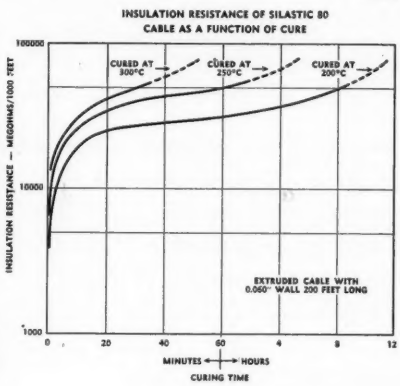
cured for several hours at high temperatures in an air circulating oven. Optimum physical and electrical properties can be obtained only after such oven curing. Figure 10 shows the increase in insulation resistance of silicone rubber insulated cable with various cures following the initial vulcanization. The insulation resistance

FIG. 10



of the cable increases to more than 50,000 megohms per 1000 feet after curing for 8 hours at 200 C. Comparable insulation resistance can be obtained by curing for 30 minutes at 300 C. This suggests the possibility of curing extruded cable continuously by passing it through a high temperature curing tower.

Summary

Several typical silicone rubbers have been reviewed briefly showing the improvements made in their properties during the past few years. A new type of silicone rubber using an improved fumed silica as a filler has been reviewed in detail. These fumed silica filled silicone rubber stocks are believed to have the best electrical properties and the widest utility of any silicone rubber available today for general application as cable insulation. The electrical properties are stable over a wide temperature range and are not affected adversely by moisture, corona, weathering, or aging at high temperature. These stocks can be fabricated using conventional methods or a hot air method not requiring steam as a vulcanizing medium.

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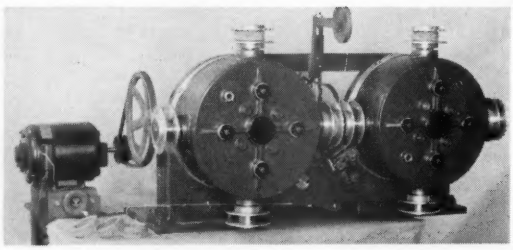

Winds short coils (25′ to 200′) continuously. Traverse wire with layer wind. When proper length is wound, guide is forced by solenoid action to opposing spindle turning at same speed. When sufficient turns are wound on second spindle—a knife jumps between heads and cuts wire connecting the two coils. The head with the full coil indexes upward and an empty coil comes into winding position. Operator then easily removes full coil and ties it as desired. Works particularly well with bell and stove pipe wire. Can be speeded for long coils—slowed for shorter. ½H.P. motor provides ample power. Operator requires no training, skill or experience.

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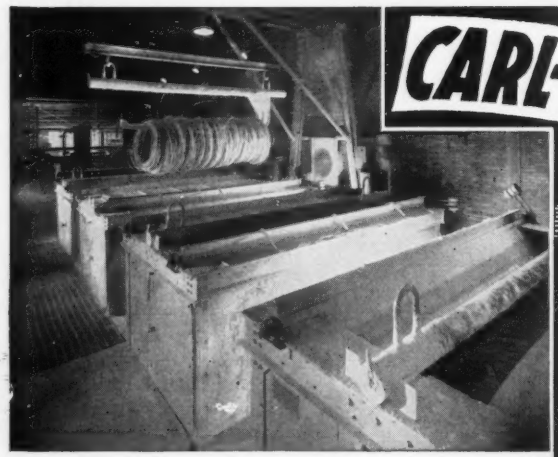

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CLEVELAND, OHIO

Stainless Steel Wire Properties Are Affected by Draw Speed

(*Continued from page* 523)

nickel caused an upward displacement in the relative positions of curves; i.e., the Hc was increased for the same speed of draw when the nickel content was increased.

★ ★ ★

Speed of Draw Vs. Remanence: When the remanence vs. rate of draw curves for the two analyses of set I were plotted, they did not follow similar patterns as with the coercive force curves, see Fig. 2. The 302 curve showed a high Br value at low draw speeds which gradually decreased at increasing speeds and then levelled off at high rates of draw and remained relatively constant as in the case of the Hc values. The curve for the 304 specimens behaved differently in that the first values of Br at slow rates of draw were low. As the rates of draw increased, these values also increased and subsequently decreased gradually.

★ ★ ★

The data from set I plus that of set II indicated that higher nickel contents at medium to rapid rates of draw showed lower values of Br. However, set I showed that the higher nickel 302 specimens at slow rates of draw showed values of remanence about 45 pct. greater than the lower nickel 304 specimens—in fact 9 pct. greater than any other obtained with the lower nickel analysis regardless of drawing speed. The change of Br, within the higher nickel (set I, 302) specimens, was larger over the range of draw speeds studied than the lower nickel (set I, 304), namely, 51.0 pct., versus 27.2 pct., respectively.

★ ★ ★

Speed of Draw vs. Ultimate Tensile Strength: Plotting the rate of draw versus the ultimate tensile strengths developed in wires of both the 302 and 304 analyses generated two similarly appearing curves, Fig. 3, but, as in the Hc set, see Fig. I, displaced from each other. Initially, the values were high at low draw rates but decreased gradually to a value which remained relatively stable from

medium to very rapid draw rates; i.e., constant from about 200 ft. per min. up to 3900 ft. per min. The maximum decrease in tensile strengths obtained at rapid rates of draw for the "constant" tensile value over the initially high (lowest rate of draw) value was approx. 6 pct. for the 302 specimens and 4 pct. for the 304 specimens. The higher carbon 302 specimens for both sets I and II showed higher tensile values, approx. 4 pcts. higher for set I and 10 pct. higher for set II. The low carbon content 304 tensile strength at the 50 ft. per min. rate of draw was equivalent to the higher carbon containing 302 drawn at the 300 ft. per min. and faster rates. The low tensile strength indicated for the 302 curve drawn at 100 ft. per min. was possibly caused by imperfections along the wire length imparted by an improperly set die; i.e., the wire drawing phenomenon referred to as "chatter." The "dips" in the curves at the rate of draw of 2000 ft. per min. were probably caused by a mechanical fluctuation of the drawing unit during drawing.

★ ★ ★

Speed of Draw vs. Resistivity: Curves of the electrical resistivity vs. rate of draw were not too similar except that they showed a trend of decrease in resistivity as the speed increased, see Fig. 4. For the 302 specimens curve of set I, the rapidly decreasing trend stopped at the speed of draw of approx. 300 ft. per min. where the resistivity tended to level off to a slowly decreasing value. Between the draw speeds of 50 to 300 ft. per min. a drop of 10 pct. maximum was observed. The curve for 304 specimens of set I indicated a gradual decrease through all the range of speeds of draw studied. The greatest decrease in electrical resistivity observed was approx. 10 pct. In both sets of curves, the greatest values of resistivity were found to occur at the lowest speeds of draw.

★ ★ ★

Using the data from both sets I and II, it was observed that the resistivities were decreased by an increase in nickel content; i.e., for

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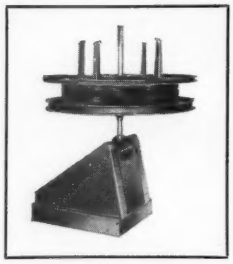

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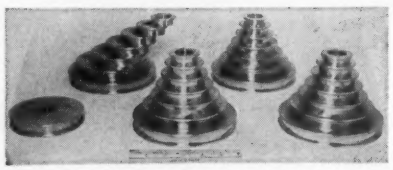
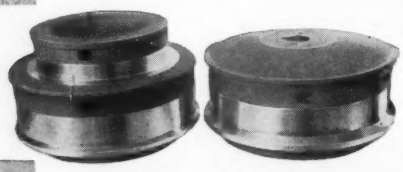


SYNCRO A-16 DRAW RINGS

Pictured at left and below are some wire drawing machine blocks. Many other parts can be hardsurfaced to advantage.



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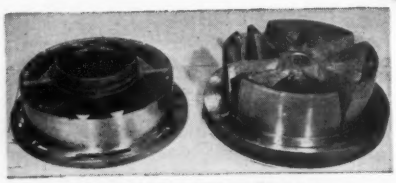

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the same rate of draw, a wire from an analysis of greater nickel indicated a lower specific electrical resistance. The specimens for the lower nickel 304 curve of set I at very low rates of draw showed a value of resistivity approx. 10 pct. greater than did the specimens of the higher nickel 302 curve for the same slow rate of draw, namely, 50 ft. per min. A maximum difference of about 20 pct. was found between the two analyses over the range of draw speeds studied.

Why Varying Draw Speeds Effect 18/8 Wire Properties

A possible explanation of the observed effects found on the electrical and mechanical properties of 18/8 stainless steel by varying the rates of draw would be as follows: Cold deformation of a metastable austenitic 18/8 stainless steel converts the austenite to martensite, provided the temperature during the cold deformation is not much greater than room temperature. During the process of pulling wire through a die or a series of dies, an increase in the temperature of the wire occurs, because of deformation and friction. The wire usually is cooled by the lubricant to approximately room temperature in the time that it moves the distance between dies. Should the temperature become greater, less transformation to martensite will occur. If the drawing speed is increased to the point where the lubricant can no longer cool the wire rapidly enough, the temperature of the wire will increase above the room temperature existing. Thus the greater the speed of draw, the greater the temperature, and the less the transformation of martensite; consequently, the remanence, resistivity and tensile strength will be lower and the coercive force will be greater.

★ ★ ★

Conclusion

It was found that variations did occur in magnetic properties, ultimate tensile strength, and specific electrical resistance of commercial stainless steel wires when the rate

of draw of these wires was varied. With increasing rates of draw it was found that coercive force increased, while remanence, tensile strength, and resistivity decreased. The variations in coercive force and remanence were considerable, while those of tensile strength and specific resistance, although significant, were much less. Increasing the nickel content caused, for the same rate of draw, an increase in Hc and a decrease in Br and resistivity. Increased carbon contents produced greater tensile strengths for the same rate of draw.

★ ★ ★

Based on the above, it would seem probable that an 18/8 stainless steel analysis which might normally have been considered as rejectionable for a particular specification, could be saved by the proper choice of draw speed.

Acknowledgment

The author should like to thank the Wilbur B. Driver Co. for its kind permission to publish this article.

Chase Brass to Sell Stainless Steel

Stainless steel, in sheet, bar, wire and tube, has been added to the warehouse stocks of **Chase Brass & Copper Co.**, a subsidiary of **Kennecott Copper Corporation,** according to an announcement made today by **Richard C. Diehl,** president of Chase. Effective April 5, Chase will merchandise stainless steel from its 27 warehouses and sales offices across the country through an arrangement made with several producers of stainless steel.

★ ★ ★

This move will have no effect on continued production of brass and copper products by Chase. The 78-year-old brass concern, one of the largest in the world, produces brass and other copper alloy products in sheet, rod, wire, pipe and tube in its three large mills in Waterbury, Conn., and Cleveland, Ohio, and according to Mr. Diehl is currently engaged in an extensive program of expansion and modernization of these facilities in both cities.

★ ★ ★

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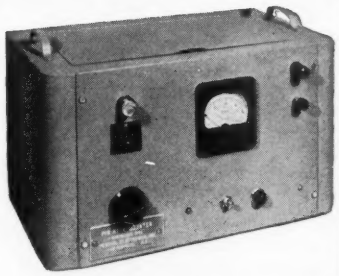

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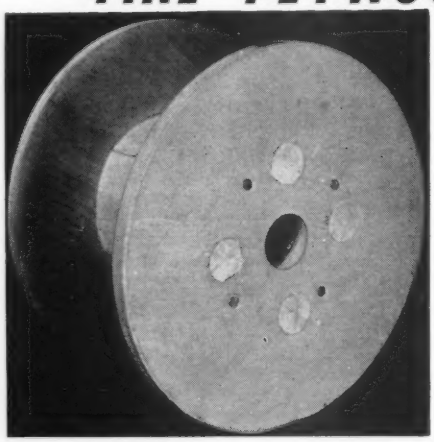

Made of *air* dried wood, all parts secured with dowel pins, making the reel *all wood* in construction. These are the famous dowel constructed reels originated by WINCHESTER.

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Made in diameters of 6" to 48", returnable and non-returnable.

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Our Products Carry Reel Loads.

Commenting on the new sales arrangements, **Bruce A. Dean,** vice-president, sales, said: "We believe that we can render a more complete service to our thousands of customers all over the United States by the addition of stainless steel products to our lists of brass and copper items. A great many of our customers use both stainless steel and brass and copper in their manufacturing businesses."

★ ★ ★

This new sales policy does not differ greatly from the company's old-established policy of handling many miscellaneous products—such as bolts, nuts, rivets, bearing bronze, soldering copper, etc.—that it has carried as warehouse items for many years. The company hopes to render a more complete service to its customers whose interest include stainless steel as well as brass and copper products."

Takes Over Philips Dealership in Oklahoma

W. A. Schueter has been appointed dealer in the southwest for products of the Research & Control Instruments Division, **North American Philips Company, Inc.,** 750 South Fulton Avenue, Mount Vernon, N. Y., it has been announced by **C. J. Woods,** national sales manager.

★ ★ ★

The new organization will be known as the **Southwestern Electronics Corporation** and will occupy a new building on May 1 at 3920 South Peoria Avenue in Tulsa.

★ ★ ★

The complete line of Philips X-ray analysis, radiography and medical equipment and the EM 75 and EM 100 electron microscopes will be displayed and demonstrated at the Peoria Avenue headquarters.

★ ★ ★

Donald Hampton and **Mrs. Hazel Parker** will be members of the Tulsa staff and will help to handle customers in the territory served which includes Oklahoma, Kansas, Arkansas and the northern part of Texas.

(*Continued from page* 513)

hole in the bracket, prevents lengthwise movement along the arm.

★ ★ ★

During installation, the wire is payed out along the line either from a moving reel carried on a truck or trailer, or from a stationary reel. When installed from a stationary reel, wire is raised into the "J" supports on the poles as soon as possible to avoid excessive dragging along the ground. The support wire is permanently attached to the first pole, using a dead-end sleeve or clamp. The wire may be tensioned in several spans, the number of spans being determined by the severity and number of direction changes in the line. The proper tension is determined by sight-sagging. The wire is then fastened at the intermediate poles by separating the insulated conductors from the support wire and by clamping the latter in the brackets. A short length of split plastic tube is placed around the bunched conductors to protect them from abrasion by the fixture. Such tubes can be seen in Figures 4 and 5.

★ ★ ★

Occasionally, to permit passage of vehicles, it is necessary to raise the wire temporarily over roads or driveways before the entire length is pulled up to tension. This is accomplished readily by placing a wedge-type clamp over the complete wire, pulling the slack by hand, and then securing the clamp temporarily to the pole beyond the driveway.

★ ★ ★

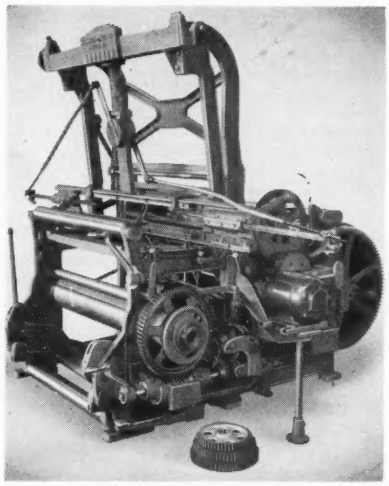
Where heavy corner pulls are encountered, it is considered best to tension up to the corner pole, dead-end and support wire both ways, and continue to tension the remainder of the run away from this pole.

★ ★ ★

The light weight of the wire and the design of the attachments are such that, for repairs, the wire may be disengaged readily at one or more points and lowered to a

NEW MODERN FLY SCREEN WIRE LOOMS

Four Sizes: 36", 48", 60" and 72" Widths



TYPE No. 239

Made in 36" and 48" widths:

Shown at the left.

TYPE No. 239-360

Made in 60" and 72" widths:

These larger looms have stronger frames and heavier construction throughout.

The take-up and screen tension of the 60" and 72" widths, is effected through a ratchet, instead of the usual worm gear and weight arrangement.

Speed changes of the loom are made by changing different sizes of the motor drive pinions.

On the 48" width and wider, extension slides are provided to support and guide the longer shuttle bars.

Steel shell warp drums are used.

All looms are provided with an electric stop, which instantly stops the machine when either a warp or a cross wire breaks.

write for details on this or other type looms you may need

We make four heavier types.

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Music Wire for Industrial Purposes
211 sizes Bright Polished, .0015" to .3125"
45 sizes Bright Tinned, .003" to .125"
Aluminum—Annealed—Belt Lacing—Brass, Soft and Spring—Copper, Bare and Tinned
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Monel—Nickel Silver—Pure Soft Nickel—Oil Tempered, Steel Spring, Black Finish
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in an Envelope—Florist Wire—Spooled and Coiled, ¼-½-1-5#
Wires Straightened and Cut to length—Small Gauges—Small orders our specialty
Wires and Strands for the fishermen. Trolling Wires, Copper-Monel-Stainless.
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PRODUCERS OF Manufacturer's Wire in many sizes, shapes, tempers and finishes, including Galvanized. KOKOTE, Flame-Sealed, Coppered, Tinned, Annealed, Liquor Finished, Bright, Lead Coated, and special wire. ALSO, Coated and Uncoated Steel Sheets, Nails, Continental Chain Link Fence, and other products.

height convenient for working from the ground. At road crossings where the wire cannot be lowered for maintenance purposes because of vehicular traffic, a ladder platform truck is required, since the wire is not strong enough to support a workman on a ladder or in a cable car.

★ ★ ★

It is expected that this rural distribution wire will be relatively free from some of the difficulties encountered in the usual open wire and cable constructions due to vibrations caused by wind. These vibrations are of two types, one a high frequency, low-amplitude vibration frequently observed on open wire lines and usually accompanied by audible "singing"; the other a low frequency, high amplitude vibration in which the cable or wire whips up and down violently, is frequently referred to as "dancing." The damping effect of the insulated pairs on the support wire and the favorable cross-section of the wire, essentially round, both tend to minimize these two types of harmful vibration.

★ ★ ★

Rural distribution wire has found many applications for providing communication circuits to customers at lower cost than has been possible with previous standard facilities. The rural wire is used largely to supplement existing cable and open wire lines and, under favorable conditions, is being used for extensions from such plant.

Nopco Names New Mid-West Sales Manager

T. A. Printon, President of **Nopco Chemical Company,** has announced the recent appointment of **Richard F. Spain** as Mid-West District Sales Manager. From Nopco's Chicago Office, Mr. Spain will be in charge of technical liaison and chemical sales for aviation, adhesives, cement, cosmetics, lubricants, metal working, paints, plastics, protective coatings, pulp and paper, tanning, textiles, and allied industries.

★ ★ ★

A company employee since 1941, Mr. Spain is well acquainted with many of the technical problems in this area through his work as a chemist in Nopco's Control and sales Service Laboratories and, for the past eight years, as an outstanding member of the sales force in Illinois and Iowa. His new duties include heading Nopco personnel in twelve Middle Western states.

Crucible Appoints Chief Engineer

Crucible Steel Co. of America, Pittsburgh, Pa., has appointed **James K. Watkins** chief engineer of its Midland, Pa., Works. He succeeds **John Ferm,** who has retired recently. Mr. Watkins joins Crucible after serving since 1944 as chief engineer for Pittsburgh Steel Company's Monessen Works.

Die Measurement and Inspection

(*Continued from page* 515)

if it is no more accurate than is warranted by its function. All in all, the Profiloscope is presented as an instrument of limited accuracy, cheap and simple to use, giving die angles to $\pm\frac{1}{2}°$, and a very good picture of die wear.

The Progress of Mechanical Descaling of Rods for Wire Drawing

(*Continued from page* 510)

can get it to stick—that's the important thing. If it doesn't then it just doesn't come through, mainly due to not having any coating.

In that connection and on temperature, we find differences in wire drawing machines. In running high carbon wire we normally use our older machines. Of course, the cooling isn't as good and it may mean that we will need better machines for cooling and for the processing of mechanically descaled rods, because what you run on one machine will not run as well on another.

A Member: I would like to ask Mr. Stalson a question.

You mentioned residual oxide film after a scale breaking as a lubricant—is that right?

Mr. Stalson: That is right.

A Member: How important is that dust that clings to the rod after the scale breaking? Would it be better to remove it more thoroughly than just wiping it with cotton and so on?

Mr. Stalson: We do not think the loose dust is of sufficient consequence to warrant special means of removing it. A portion of the dust accumulates in the lubricant of the ripping die box the same way lime builds up from lime coated rods. The balance probably functions like additional filler in the lubricant. In addition to the loose dust, we believe there is an adherent inner scale that is an aid to the lubricant in the die box.

A Member: Mr. Harper, how does that compare with your experience with the shot peen rod?

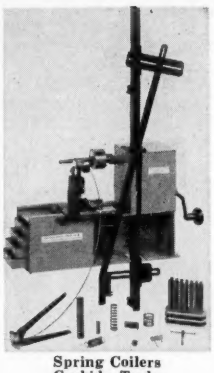
Mr. Harper: With that type of rod the texture has small indentations and it gives it a surface that is not slick. It allows our coating to remain on the wire when it is being drawn. After it is drawn there is a sufficient amount still remaining so that we can lubricate our cold heading dies. We could not use any descaling method that would not leave us a good surface for our wire drawing operation.

The question was also asked as to the type of unit that we use. I would like to say that at the present time we are using or working with the wheelabrator people on designing us a new unit where we will have mechanically operated shot peening wheels that are driving the shot down on the rod from three different angles. The wire on the new machine will convey the rod around. It will run through the machines and be coiled onto large spools. We would not, under any circumstances, spool our wire on any spools on which the minimum diameter would be less than eighteen inches. That is how critical we think the bending operation is to us.

Chairman Miller: Mr. Godfrey, would you like to continue?

Mr. Godfrey: I have just one thing that I would like to point out. In Mr. Harper's method he eliminates the coating after the shot peening. In other words, they have a special operation.

Mr. Harper: We just use the same kind of coating that we now use on our pickling setup. We have tried all types of lubricants and so far we have not been successful. We have tried oils and now we are going into oils again.



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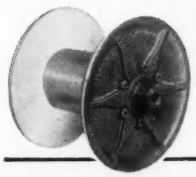

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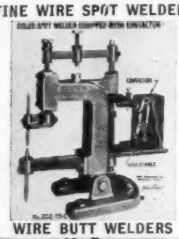

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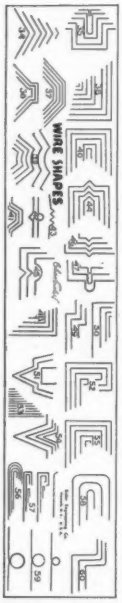
Cam Milling Service



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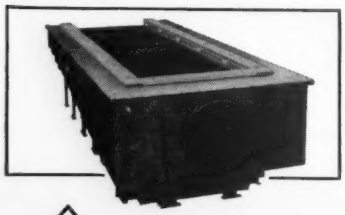

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That is one reason I mentioned the fact that we have this problem of industrial waste—that we have to wash our bolts—and that we have even been able to shotpeen after the bolts have been headed and rolled. We have actually been able to make our heads meet our close tolerances on Class II fittings. Further, our galvanizing procedure is far superior to our acid rinse afterwards.

Mr. Godfrey: I would just like to comment about the purpose of the iron oxide coating that Mr. Stalson talked about. You sometimes form iron soaps from the oxide and iron soaps are good lubricants in spite of the fact that they have a low melting point.

A Member: When you bend the rod and break out the scale you get a silver finish and there is no adherent oxide film that I know about and so therefore you are talking about something that I would like to have you elaborate on.

We get an oxide powder that can be removed with your fingers or very readily removed. It has no adhesion, however, to the surface and so I am interested to know whether you are talking about loose oxide powder or whether it is something else?

Mr. Stalson: Frankly, we are not exactly sure. We have sent some samples to another laboratory and they are examining them now. The question we are asking is whether or not there is anything on the surface besides the dust. The burnish mark I spoke of was readily visible against the remaining surface of the rod which was darker and duller in appearance.

Mr. Stalson: It has enough color to be seen by the unaided eye. The color is a light shade of gray.

A Member: Some of the European writers have claimed that the iron oxide as distributed on the surface of a rod is three oxides, and not one, and that the three vary from very unstable to the most stable on the outside, which could become red rust.

Have you made any attempts along that line?

Mr. Stalson: No we have never made an attempt to discover that.

A Member: This question is directed to Mr. Godfrey.

On 702 and 725 carbon steel, how many drafts are you giving?

Mr. Godfrey: We have tried it five or six holes. Normally, with a side cleaning material we would do the same amount of drawing in one less hole. In general we add another hole. We lighten up the draft all the way along. Sometimes we will give the first hole the benefit of the extra die. However, normally we will just divide it up between the five or six dies, but use one more die than normally.

A Member: On the lubricants you also mentioned that you wanted to secure a lubricant that would cling to the wire or to the rod—sufficiently plastic, I believe, to actually coat the rod or wire.

Do you find on these higher carbons that you tend to go toward the richer lubricants or one lubricant that is right in the middle.

If you took a fifty-fifty mixture with high carbons, would you tend to be on the richer side?

Mr. Godfrey: I would say that you

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New Haven, Connecticut

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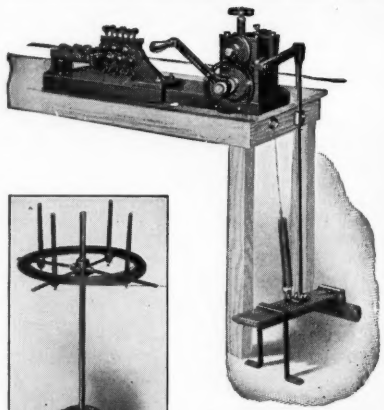

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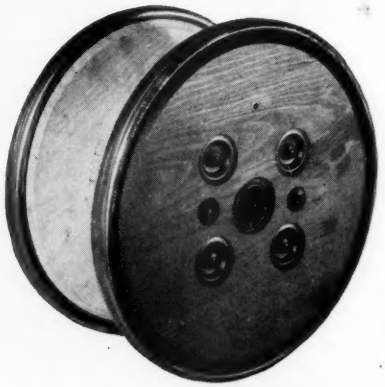

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ought to go to the leaner side. Everybody tends to make a leaner mixture, and we get beneficial results by leaving out the soap. There is more separation.

A Member: Do you find then that they will become sufficiently plastic to coat the wire and rod?

Mr. Godfrey: Yes, provided we don't go too fast. You are limited on your speed. You can do it successfully if you want to sacrifice some speed. I would say that you benefit by going to the leaner side rather than to the richer side because the richer the soap, the sooner it will melt.

A Member: Has anyone had any experience in mechanically descaling nine or ten gauge material? My twenty-two inch coils of stock cost a lot more to clean than a thirty-six inch coil of stock per ton. Is there anyone who has cleaned any of the small stuff mechanically?

Mr. Smigel: I think that LaClede did a certain amount of that work and it ran successfully. I don't know whether it falls right into those sizes you mentioned, but I know that they did that.

Mr. Harper: We have cleaned some small wire—about ⅛" high carbon, but that is no indication to us that it will not be as successful as the larger diameter. I think that on the smaller sizes you can clean them more economically as you go down. What the limits are downward, I don't know, but we cleaned some on a standard "wheelabrator" because we wanted to see its effect on making some small rivets.

A Member: Do you need any special type of cleaning after mechanical descaling in order to copper-coat wire?

Mr. Stalson: I don't think that you would have any greater problem than you would in chemically copper coating a conventional wire. I am thinking of galvanized wire, where you burn off the lubricant and the coating. These descaled wires galvanize extremely well.

A Member: Do you have any trouble in cleaning the dark pores on nails?

Mr. Stalson: Yes, we have had some contradictory results on cleaning nails. Original trials with decaled nails required longer cleaning cycles than conventional nails. But with slight modifications to the cleaning practice it was possible to get the cycle for descaled nails down to the same length of time as the regular nails. Other trial quantities have cleaned with no trouble at all.

Mr. Smigel: Have you found that those nails tend to rust more? We have had one report that they rust readily and the mill has abandoned that process for that reason.

Mr. Stalson: I haven't heard about that.

Chairman Miller: We have some written questions here and I have given them to the panel members to whom they have been addressed.

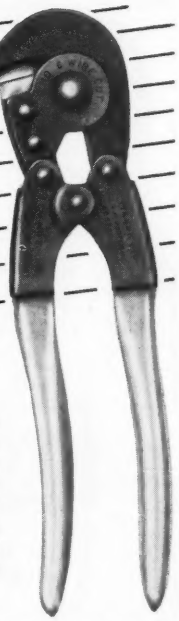
I shall start with Mr. Godfrey and follow right down the line to the other end.

Mr. Godfrey: The first question that I have is: "How large a wire do you feel practical for mechanical descaling?"

I really don't know. We have one production setup where we are descaling a rod .312 in diameter. Maybe some of you gentlemen saw that last spring in connection with a grinding operation.

HKP PORTER

HANDKLIP 6C WIRE CUTTER



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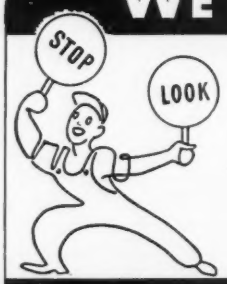

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THE WIRE ASSOCIATION

REGIONAL MEETING: June 11, 1954, Los Angeles, California. Registration, headquarters for plant inspection trips and luncheon at the new warehouse of Colorado Fuel and Iron Corporation. Cocktail hour, dinner, door prizes, after dinner speaker and sound motion picture at the Statler Hotel, Los Angeles.

ANNUAL CONVENTION: Statler Hotel, Detroit, Mich., November 8-11, 1954. Ferrous and non-ferrous technical sessions and two plant inspection trips. There will be many other features, including the Annual Luncheon, the Mordica Memorial Lecture, which will be commemorative to the Silver Anniversary of the Association, and the Annual Stag-Smoker Dinner and Show.

THE WIRE ASSOCIATION
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It goes through a descaling machine and it is drawn one hole through grease and then through a grinding machine. I imagine that you could go to a larger diameter than .312. It depends on how strong the man is that has to bend the rod around the roller. I believe that is the only limitation. I imagine that a half inch rod would be too much.

The next question is: "Has Roebling ever tried sheaves with pitch diameters larger than three inches?"

We have experimented up to six inches in diameter. Although we are now using three-inch, we could possibly go to a larger diameter and do a fairly good job.

The next question is: "Is there any measurable effect on the efficiency of descaling tracable to variation in rod mill coiling temperature?"

Most of our work, at least in the past year, has been on either air or lead patented material. The only thing that I can say is that air patented rods seem to descale easier and the scale comes off cleaner.

From what I have read I would say that the higher the temperature of a rolled rod, the easier the scale can be removed. We have really not had much experience with the hot rolled rod. Maybe some of the other panel members who are doing more with the hot rolled rod than we are might answer that question.

Mr. Stalson: I would like to add to that. We have been observing that and your thoughts on it are substantially right. The scale does vary with the finishing temperature in the rod mill and actually there have been cases where we think that with less water in the rod mill, and consequently more scale on the rods, we were able to get a cleaner descaled rod. It also seems to vary a little with the different grades of steel.

Chairman Miller: Mr. Harper has to catch a plane and we are going to let him go unless someone has any questions that they would like to direct to him.

Does anyone have a question that he wants to direct at Mr. Harper at this time?

A Member: Are you planning to throw out most of your equipment and go into mechanical scaling because of the situation in Pennsylvania?

Mr. Harper: I think that we are going to be forced to. We are going to approach it, probably, on a two or three-year program. We naturally want to get all of the life out of the existing equipment that we can and we are going to try to put off the Department of Public Health until they say that we just have to do it.

They have told us that we must do something and so now we are separating all of our industrial waste from our sanitary waste and that is quite a problem. Our plant stretches over some six blocks and it is an old plant. We do not even know where some of the sewers run.

Therefore, we have gone through quite an experience and it has been quite costly and I am sure that we are going to be forced to go to mechanical descaling.

We have run wire from 1/8" up to 5/8" in descaling and there is no doubt

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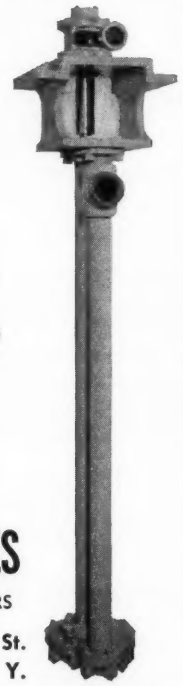

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that there is a saving over the conventional pickling method.

Just in the cleaning problem, when you go from 5/8" up to 7/8" and one inch, then your material handling problem becomes greater. Your costs are considerable against your cleaning and that slows down the machine and therefore the efficiency of the machine itself is much less.

However, I think that in the future, because of the additional machines produced in our field, we are going to ask the steel companies to give us larger coils of greater weight, from which the efficiency of our cleaning operation should be greater.

Chairman Miller: I believe that some of the other members of the panel have questions.

Mr. Smigel: "Has a compound coating been developed for mesh" and—the next question is along the same line—"Is there one for extruded products"?

I will answer the first one by saying that a mesh wire is being drawn successfully. I think that has been brought out by some of the other speakers.

To our knowledge, we do not know of any material that is being made for extruded products.

I would think that the problem would be very similar to that for drawing nails. In other words, it is necessary to have a die coating.

This next question is: "Does the continued use of either dry soap lubricants or grease in conjunction with a mechanical descaler tend to contaminate the lubricant container with abrasive particles?"

I think that we can answer that by stating that in some cases provision is made to remove most of the incoming scale particles. In other cases we have observed that the lubricant becomes quite contaminated. However, with a proper lubricant and if it rolls in the die box, it doesn't seem to make too much difference and it does not cause too much difficulty.

Here is another question: "Do you feel that the trouble thus far experienced has been due to improper lubricants?"

I really don't think that is the case at all for I feel that there are a great many good lubricants on the market that are suitable for descaling. Some of these are special lubricants that have been devised for special applications, such as for nail wire, have been a very difficult problem. However, there are many other lubricants that are being used in the normal manner for drawing that can be used very successfully for drawing descaled stock.

Naturally all of the lubricant manufacturers are constantly striving to improve their product, and it is suggested that the research and development work be continued, particularly with emphasis on the use of reactive additive chemicals.

Mr. Stalson: I have a question here: "What lubricants do you use for drawing descaled rods?"

We use what I would call medium rich, dry drawing lubricants with filler contents between twenty and fifty per cent, depending on the job. In general they are the same lubricants we have been using for conventional wires and

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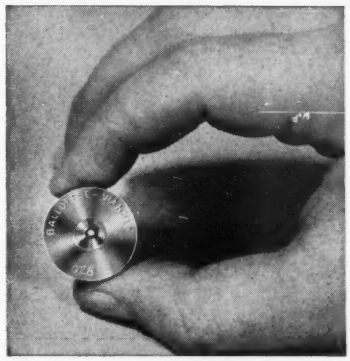

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we are doing a successful job with them.

Mr. Wickwire: There are two questions here.

"In the literature on the French descaling machine there are sketches of a roll for the purpose of preventing channelling. Have any of the gentlemen here ever had experience with that roll?"

I would like to say that our machines are all homemade.

Here is another question: "What mills are cutting nails regularly from descaled rods?"

I understand that the Pittsburgh Steel Company has cut some. I understand also that there is another company that is cutting them regularly and that they get better results than with lime-coated rods. I hear rumors that some of the midwestern mills are cutting nails regularly.

I would like to throw the lubrication problem right back at the wire drawing lubricant manufacturers, because they have not yet given us anything that will work consistently. It will work one week and the next week it won't.

Mr. Fecson: On our nail cutting dies we are getting better than sixty-five hours and on the descaler we cannot get any better than thirty-two hours.

Mr. Hedman: I have a question here: "What die design is most practical?"

We did considerable playing around when we started only to return to what we had used before.

On our high carbon wire we have a 16° angle and about a 75% bearing.

On our low carbon it is from 18° to 22° and a 50% bearing.

In both cases there is a 90° back relief. However, we do have to pay more attention to the bell opening and especially on our first die.

Here is another question: "Have you found difficulties in obtaining desired finish on wire drawn from descaled rod?"

As far as I know, we don't have any data on customer reaction whatever. From what I have seen it is somewhat darker in color.

★ ★ ★

Chairman Miller: There are several questions that I too would like to ask and I know that there must be many of them in the audience. However, we have run out of time.

★ ★ ★

I think that this has been an excellent discussion and I would like to recommend to the next program chairman that if he needs a good subject that here is really one.

★ ★ ★

Thank you, panel members, and also the others of you for being present. This meeting is now concluded.

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To Break Ground in May For New Metals Plant

Westinghouse Electric Corporation will break ground in May for construction of its new multi-million-dollar metals plant at Blairsville, Pa., it was announced by **Warren M. Trigg,** plant manager.

★ ★ ★

The main building exterior should be completed by the end of this year and most of the machinery and equipment installed and operating by mid-1955.

★ ★ ★

The main purpose of the new metals plant will be to bridge the gap between research and the commercial application of metals in the electrical industry.

★ ★ ★

This plant will provide equipment for the basic metal working processes of melting, forging, hot-rolling, cold-rolling, conditioning, pickling and heat-treating. In addition, facilities for the newer foundry techniques of investment casting and shell-mold casting will be installed. Also provided will be equipment for limited manufacture of powder metal parts.

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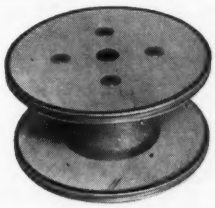
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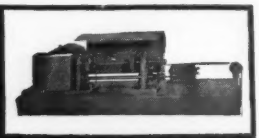
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Detrex Appointments

The Detrex Corporation of Detroit, manufacturer of industrial metal-cleaning machinery, chemicals, and drycleaning equipment, has announced the appointment of **Phil H. Richey,** assistant treasurer, to the position of assistant works manager.

★ ★ ★

A. O. Thalacker, Detrex president, said that Mr. Richey will report directly to **R. A. Emmett, Jr.,** works manager of the company's Equipment Division in Detroit. Mr. Richey also will continue as assistant treasurer.

★ ★ ★

After graduating from the University of Michigan, Mr. Richey was associated with the Detroit Bank before joining Detrex in 1948. Advancing through various positions in the Controller's office, he was appointed personnel director in 1950. Subsequently, he was assigned to special duties in the office of **E. W. Allison,** treasurer.

Scovill Moves Rochester Office to New Quarters

Scovill Manufacturing Company, Waterbury, Conn., moved its Rochester, N. Y., sales and service offices from 311 Alexander Street to 175 Dodge Street, effective April 1.

★ ★ ★

This district office, which was opened in 1950, services Scovill's customers with brass and aluminum mill products, apparel closures, lawn and garden watering accessory items and contract manufactured metal products made by this firm. **S. O. Drivdahl** continues as manager.

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★ ★ ★

Mr. Perry joins Firth Sterling after four years' association with W. J. Dunn Inc. as a salesman in the New England area. He attended Boston College and has studied metallography at Massachusetts Institute of Technology.

★ ★ ★

Located at Firth Sterling's Detroit Office in its carbide sales division for four years, Mr. Crownover will represent the firm in the state of Michigan exclusive of Detroit. He is a graduate of the Detroit College of Applied Science.

★ ★ ★

Mr. Neff has represented both Firth Sterling and the Austin Powder Company, its exclusive sales agency for mining tools, in mining sales for the past four years.

ACKNOWLEDGEMENT

The author of the paper on "Precision Spring Design," which appeared in three installments in the preceding issues of WIRE AND WIRE PRODUCTS, gratefully acknowledges the permission of **Harold C. R. Carlson,** spring consultant, to use certain material contained in the **Tool Engineers Handbook.**

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The kindness of the publications **Product Engineering,** ("Instability of Springs," **J. A. Haringx,** July 1951), and **Machine Design** ("Design of Thin Cantilever Beams," **J. H. Baltrukonis,** July 1953), is also appreciated in their having given permission to make use of material on the buckling of spiral springs and on cantilever beams, respectively.

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ABRASIVES—
Elgin National Watch Co., Abrasives Div., Elgin, Ill.
Hyprez Div., Engis Equipment Co., Chicago, Ill.
Norton Co., Worcester, Mass.

ACID INHIBITORS—
(See Inhibitors, Pickling)

ACID-PROOF CONSTRUCTION—
Ceilcote Company, Cleveland, Ohio
Chemical Construction Co., Pittsburgh, Pa.
Haveg Corporation, Newark, Del.
Heil Process Equipment Corp., Cleveland, Ohio

ALLOYS—Hardsurfacing Capstans, etc.
Parkway-Kew Corp., Menlo Park, N. J.

ANNEALING MACHINES — Electric Resistance
Syncro Machine Co., Perth Amboy, N. J.
Trauwood Engr. Co., Cleveland, O.

ANNEALING POTS AND BOXES—
Scudder, E. J. Fdry. & Mach. Co., Trenton, N. J.

BAKERS—
(See OVENS—Rod Bakers)

BOBBINS—Braider & Wire Weaving
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Milton Machine Works, Inc., Milton, Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Standard Mill Supply Co., Pawtucket, R. I.
Wire & Textile Mach'y, Inc. (used) Pawtucket. R. I.

BORAX—Wire Drawing
Pacific Coast Borax Co., New York, N. Y.

BORON CARBIDE—
Norton Co., Worcester, Mass.

BRAKES—Pneumatic
Entwistle, Jas. L. Co., Providence, R. I.

CARRIERS—Braider, High Speed
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New England Butt Co., Providence, R. I.
Wire & Textile Mach'y, Inc. (used) Pawtucket. R. I.

CASTINGS—Wire Mill
Scudder, E. J. Fdry. & Mach. Co., Trenton, N. J.

CEMENTS—Acid Proof
Ceilcote Company, Cleveland, Ohio

CEMENTS—Refractory
Norton Co., Worcester, Mass.

CLEANERS—Metal
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Phila., Pa.
Metal & Thermit Corp., New York, N. Y.
Parkin Chemical Co., The, Pittsburgh, Pa.
Standard Industrial Compounds Co., Chicago.

CLEANING & PICKLING EQUIP.—
Ceilcote Company, Cleveland, Ohio
Chemsteel Construction Co., Pittsburgh, Pa.
Cleveland Tramrail Div., of the Cleveland Crane & Engineering Co., Wickliffe, O.
Haveg Corporation, Newark, Del.
Holden, A. F., Company, The, Detroit, Mich.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wean Equipment Corp., Cleveland, Ohio
Wilson, Lee, Engr. Co., Cleveland, Ohio
Youngstown Welding & Eng'g Co., Youngstown, Ohio.

CLOTH—WIRE, All Metals
Chase Brass & Copper Co., Waterbury, Conn.
Gantois, Saint Die (Vosges), France.
Wickwire Bros., Cortland, N. Y.

COATING COMPOUNDS—
Apex Alkali Products Co., Philadelphia, Pa.
Miller, R. H., Co., Inc., Homer, N. Y
Standard Industrial Compounds Co., Chicago

COMPOUNDS—Coppering
American Chemical Paint Co., Ambler, Pa.
Miller, R. H. Co., Inc., Homer, N. Y.

COMPOUNDS—Diamond (Pre-Mixed)
Eastern Carbide Corp., New Rochelle, N. Y.
Elgin National Watch Co., Abrasives Div., Elgin, Ill.
Hyprez Div., Engis Equipment Co., Chicago.
Superior Abrasive Labs., Yonkers, N. Y.
United States Industrial Diamond Corp., New York, N. Y.

COMPOUNDS—Extrusion, for Wire
(See COMPOUNDS—Vinyl)

COMPOUNDS—For Improving Drawing and Extrusion
American Chemical Paint Co., Ambler, Pa.

COMPOUNDS—Metal Finishing
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Metal & Thermit Corp., New York, N. Y.

COMPOUNDS—Phosphate Coating
American Chemical Paint Co., Ambler, Pa.

COMPOUNDS—Rust Preventing
American Chemical Paint Co., Ambler, Pa.
American Lanolin Corporation, Lawrence, Mass.
Apex Alkali Products Co., Philadelphia, Pa.

COMPOUNDS—Rust Removing
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Standard Industrial Compounds Co., Chicago.

COMPOUNDS—Vinyl, for Wire
Electronic Rubber Co., Stamford, Conn.

COMPOUNDS—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Bick, Hans C., Inc., Reading, Pa.
Cook's Sons, Inc., Adam, Linden, N. J.
Miller, R. H. Co., Inc., Homer, N. Y.
Nopco Chemical Co., Harrison, N. J.
Pacific Coast Borax Co., New York, N. Y.
Standard Industrial Compounds Co., Chicago.
Swift & Company, Chicago, Ill.

CONDUCTORS—Flexible, Electrical
Montgomery Co., The, Windsor Locks, Conn.

COPHOLDERS—Steel
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Wire & Textile Mach'y, Inc. (used) Pawtucket. R. I.

CORDS—Electrical, Tinsel Conductor
Montgomery Co., The, Windsor Locks, Conn.

CRANES—Wire Mill
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

CUTTING TOOLS—Carbide
Carboloy Dept. of General Electric Co., Detroit.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Metal Carbides Corporation, Youngstown, Ohio
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Utica Drop Forge & Tool Corp., Utica, N. Y.
Vascoloy-Ramet Corp., Waukegan, Ill.
Willey's Carbide Tool Co., Detroit, Mich.

CUTTING TOOLS—Wire
Porter, H. K. Inc., Somerville, Mass.

DESCALING PROCESS—Sodium Hydride
du Pont de Nemours & Co., Inc., E. I., Wilmington, Del.

DIAMONDS—Industrial
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
United States Industrial Diamond Corp., New York, N. Y.
Wayne Wire Die Co., Hillside, N. J.

DIAMOND POWDERS—
Danforth, The C. W. Co., Youngstown, Ohio
Elgin National Watch Co., Abrasives Div., Elgin, Ill.
Hyprez Div., Engis Equipment Co., Chicago, Ill.
Indiana Wire Die Co., Ft. Wayne, Ind.
Industrial Diamond Powders, Pittsburgh, Pa.
National Research Company, St. Clair Shores, Mich.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
United States Industrial Diamond Corp., New York, N. Y.
Universal Wire Die Co., Cranford, N. J.
Wayne Wire Die Co., Hillside, N. J.

DIAMOND POWDER RECLAIMING—
Danforth, The C. W. Co., Youngstown, Ohio
Industrial Diamond Powders, Pittsburgh, Pa.
National Research Co., St. Clair Shores, Mich.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.

DIAMOND TOOLS—
Indiana Wire Die Co., Ft. Wayne, Ind.
Metal Carbides Corporation, Youngstown, Ohio
Nord International Corp., Orange, N. J.
Universal Wire Die Co., Cranford, N. J.
Wayne Wire Die Co., Hillside, N. J.
Willey's Carbide Tool Co., Detroit, Mich.

DIES—Carbide, Tungsten & Tantalum
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., Inc., New York, N. Y.
Carboloy Dept. of General Electric Co., Detroit.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corp., Youngstown, O.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Universal Wire Die Co., Cranford, N. J.
Vascoloy-Ramet Corp., Waukegan, Ill.
Wayne Wire Die Co., Hillside, N. J.
Willey's Carbide Tool Co., Detroit, Mich.

DIES—Cold Heading
Carboloy Dept. of General Electric Co., Detroit
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Indiana Wire Die Co., Ft. Wayne, Ind.
Metal Carbides Corporation, Youngstown, Ohio
Vascoloy-Ramet Corp., Waukegan, Ill.
Willey's Carbide Tool Co., Detroit, Mich.

DIES—Diamond
Ajax Industrial Supplies, Inc., Fort Wayne, Ind.
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., Inc., New York, N. Y.
Cochaud Wire Die Inc., New York, N. Y.
Ft. Wayne Wire Die, Inc., Fort Wayne, Ind.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
New England Wire Die Co., Worcester, Mass.
North American Philips Co., Inc., Elmet Div., Lewiston, Me.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Universal Wire Die Co., Cranford, N. J.
Wayne Wire Die Co., Hillside, N. J.

DIES—Extrusion
Carboloy Dept. of General Electric Co., Detroit.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Metal Carbides Corporation, Youngstown, Ohio
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Universal Wire Die Co., Cranford, N. J.
Wayne Wire Die Co., Hillside, N. J.
Willey's Carbide Tool Co., Detroit, Mich.

DIES—Eyelet
Eastern Carbide Corp., New Rochelle, N. Y.
Kelly Wire Die Corp., New York, N. Y.

DIES—Nail, Nail Cutters, Feeder Blocks, Grippers, etc.
Firth Sterling, Inc., Pittsburgh, Pa.
Pittsburgh Carbide Die Co., Monongahela, Pa.

DIES—Pointing
Sjogren Tool and Machine Co., Auburn, Mass.

DIES—Repairs & Re-Cutting
Ajax Industrial Supplies, Inc., Fort Wayne, Ind.
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., Inc, New York, N. Y.
Carboloy Dept. of General Electric Co., Detroit.
Cochaud Wire Die Inc., New York, N. Y.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Ft. Wayne Wire Die., Inc., Fort Wayne, Ind.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corporation, Youngstown, Ohio
New England Wire Die Co., Worcester, Mass.
North American Philips Co., Inc., Elmet Div., Lewiston, Me.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Universal Wire Die Co., Cranford, N. J.
Vascoloy-Ramet Corp., Waukegan, Ill.
Wayne Wire Die Co., Hillside, N. J.

DIES—Special Shapes, Etc.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Indiana Wire Die Co., Ft. Wayne, Ind.
Willey's Carbide Tool Co., Detroit, Mich.

DIES—Swaging
Sjogren Tool and Mach. Co., Inc., Auburn, Mass.

DIES—Tube Drawing
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Carboloy Dept. of General Electric Co., Detroit.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corp., Youngstown, O.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Vascoloy-Ramet Corp., Waukegan, Ill.
Willey's Carbide Tool Co., Detroit, Mich.

DRAW BENCHES—
(See MACHINERY—Draw Benches)

DRUMS & TRAVERSES—For Cable Reels
Entwistle, Jas. L. Co., Providence, R. I.
Hubbard Spool Co., Garrett, Ind.
New York Engineering Co., Yonkers, N. Y.
Republic Steel Corp., Pressed Steel Div., Niles, Ohio

DRYING EQUIPMENT
Carl-Mayer Corp., The, Cleveland, Ohio
Industrial Ovens, Inc., Cleveland, Ohio.
Rockwell, W. S. Co., Fairfield, Conn.

ENGINEERS—Consulting
Lubricants—Hans C. Bick, Inc., Reading, Pa.
Wire Mill—Clarence S. Arms, Worcester, Mass.
Zinc—Imhoff, Wallace G., Co., No. Highlands, Calif.

EYELETS—Brass or Zinc
Platt Bros. & Co., The, Waterbury, Conn.

FENCING & FENCES—Wire
Interlocking Fence Co., Morton, Ill.

FOAM PRODUCING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Parkin Chemical Co., The, Pittsburgh, Pa.

FURNACES—Brazing
Electric Furnace Co., Salem, Ohio
Harper Electric Furnace Corp., Buffalo, N. Y.
Lepel High Frequency Laboratories, Inc., New York, N. Y.
Rockwell, W. S. Co., Fairfield, Conn.

FURNACES—Galvanizing Equipment
Ajax Electric Co., Inc., Philadelphia, Pa.
Electric Furnace Co., Salem, Ohio
Holden, A. F. Co., The, Detroit, Mich.
Rockwell, W. S. Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio
Trauwood Engineering Co., The, Cleveland, Ohio
Wilson, Lee, Engr. Co., Cleveland, Ohio

FURNACES—Heat Treating
Ajax Electric Co., Inc., Philadelphia, Pa.
Carl Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Holden, A. F., Co., The, Detroit, Mich.

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

Lepel High Frequency Laboratories, Inc., New York, N. Y.
Morrison, John R., Industries, Inc., Cleveland, Ohio
Rockwell, W. S., Co., Fairfield, Conn.
Spring Mfgrs. Supply Co., Plantsville, Conn.
Surface Combustion Corp., Toledo, Ohio
Trauwood Engr. Co., Cleveland, Ohio
Wilson, Lee, Engr. Co., Cleveland, Ohio

FURNACES—Induction
Lepel High Frequency Laboratories, Inc., New York, N. Y.

FURNACES—Lead Melting
Electric Furnace Co., Salem, Ohio
Rockwell, W. S. Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio

FURNACES—Pot (oil, gas, electric)
Ajax Electric Co., Inc., Philadelphia, Pa.
Holden, A. F., Co., The, Detroit, Mich.

FURNACES—Resistance Heating, Strand
(See Annealing Machines)

FURNACES—Salt Bath
Ajax Electric Co., Inc., Philadelphia, Pa.
Electric Furnace Co., Salem, Ohio
Holden, A. F., Co., The, Detroit, Mich.
Rockwell, W. S. Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio

GALVANIZING EQUIPMENT — (See MACHINERY—Galvanizing Wire)

GRINDERS—Roll
Norton Co., The, Worchester, Mass.

GUIDES—For Wire
Heany Industrial Ceramic Corp., New Haven, Conn.

GUIDE TIPS—For Extruding Machines (See NOZZLES)

HAMMERS—Nail Heading
Firth Sterling, Inc., Pittsburgh, Pa.
Pittsburgh Carbide Die Co., Monongahela, Pa.

HAMMERS—Swaging
Sjogren Tool and Machine Co., Auburn, Mass.

HARDSURFACING ALLOYS—
(See Alloys—Hardsurfacing)

HOOKS—Pickling & Liming
Youngstown Welding & Eng'g' Co., Youngstown, Ohio

HOISTS—Electric Travelling
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio

INHIBITORS—Pickling
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Parkin Chemical Co., The, Pittsburgh, Pa.

INSULATING MATERIALS—
Celanese Corporation of America, New York, N. Y.
Electronic Rubber Co., Stamford, Conn.
Glass Fibers, Inc., Toledo, Ohio
Heineman Corp., Oscar, Chicago, Ill.
Libbey-Owens, Ford Glass Co., Fiber Glass Div., Toledo, Ohio
Merrimac Paper Co., New York, N. Y.
New England Lacquer Co., E. Providence, R. I.

INSULATING MATERIALS — Paper—For Electric Wire Cable
Merrimac Paper Co., New York, N. Y.

LACQUERING SYSTEMS — See MACH.—Lacquering Electric Wire

LACQUERS—For Electric Wire
New England Lacquer Co., E. Providence, R. I.

LAME—LAHN—
Montgomery Co., The, Windsor Locks, Conn.

LIME—
Warner Co., The, Philadelphia and Bellefonte, Pa.

LUBRICANTS — For Metal Cutting, Stamping and Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Miller, R. H., Co., Inc., Homer, N. Y.
Nopco Chemical Co., Harrison, N. J.
Standard Industrial Compounds Co., Chicago.

LUBRICANTS—Wire Drawing
(See Compounds—Wire Drawing)

LUBRICANTS—Wire Rope
Swift & Co., Chicago, Ill.

MACHINERY—Armoring (Cable, Wire, Hose)
American Insulating Mach'y Co., Phila., Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J
Wire & Textile Mach'y, Inc., (used), Pawtucket, R. I.

MACHINERY—Barbed Wire
Glader Wm., Machine Works, Chicago, Ill.
Wafios, Maschinenfabrik, Reutlingen 3, Wurtt., Germany
Wean Engineering Co., Cleveland, Ohio

MACHINERY—Braiding
Fidelity Machine Co., Inc., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Wardwell Braiding Mach. Co., Central Falls, R. I.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Bunching
Cook Manufacturing Co., The, Paterson, N. J.
Federal Manufacturing Co., Wallingford, Conn.
Haskell-Dawes Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Bundling, Scrap
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Cable, Electric
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Inc., Philadelphia, Pa.
Haskell-Dawes Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
New York Engineering Co., Yonkers, N. Y.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Capstans (See Machinery—Winding Wire)

MACHINERY—Centerless Grinding
Schumag Schumacher Metallwerke, Aachen, Germany.

MACHINERY—Chain Making
Cosa Corporation, New York, N. Y.
Nilson, A. H. Machine Co., Bridgeport, Conn.
Wafios, Maschinenfabrik, Reutlingen 3, Wurtt., Germany

MACHINERY—Closing Rope
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Watson Machine Co., Paterson, N. J.

MACHINERY—Coiling Rod
Vaughn Mach'y Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Cold Heading
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Copper Wire Drawing
Aetna-Standard Engineering Co., Pittsburgh.
American Insulating Mach'y Co., Phila., Pa.
National Mach'y Exch. (Used), New York.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Covering Wire (See MACHINERY—Insulating Wire)

MACHINERY—Cutting
Eisler Engineering Co., Newark, N. J.
Lewis Machine Co., The, Cleveland, Ohio
Mettler Machine Tool, Inc., New Haven, Conn.
Utica Drop Forge & Tool Corp., Utica, N. Y.
Wean Equipment Corp., Cleveland, Ohio
Wells, Frank L., Co., Kenosha, Wis.

MACHINERY—Descaling Rod, Dry
Fisher Associates, New York, N. Y.
Herborn, Herborn, Germany.

MACHINERY—Diameter Testing Continuous
Standard Electronic Research Corp., New York, N. Y.

MACHINERY—Die Making
Boulin, Victor J., Inc., New York, N. Y.
Carboloy Dept. General Electric Co., Detroit, Mich.
Dykrex Corp., Roos Tool & Mfg. Div., Newark, N. J.
Firth Sterling, Inc., Pittsburgh, Pa.
Kelly Wire Die Corp., New York, N. Y.
Nord International Corp., Orange, N. J.
Wayne Wire Die Co., Hillside, N. J.

MACHINERY—Draw Benches
Morgan Construction Co., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Electrode Grinding
Cosa Corporation, New York, N. Y.

MACHINERY—Edging (See MACHINERY — Tandem Rolling and Edging Mills)

MACHINERY—Enameling
American Insulating Mach'y Co., Phila., Pa.
Cook Manufacturing Co., The, Paterson, N. J.
Industrial Ovens, Inc., Cleveland, Ohio
Rockwell Co., W. S., Fairfield, Conn.

MACHINERY—Extruding
Aetna-Standard Engineering Co., Pittsburgh.
Davis-Standard Sales Corp., Mystic, Conn.
Royle, John, & Sons, Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Fence
Glader, Wm., Machine Works, Chicago, Ill.
Interlocking Fence Co., Morton, Ill.
Wean Equipment Corp., Cleveland, Ohio

MACHINERY—Filament Coil Winding
Eisler Engineering Co., Newark, N. J.

MACHINERY—Flat Wire
Mettler Machine Tool, Inc., New Haven, Conn.
Torrington Mfg. Co., Torrington, Conn.
Wean Equipment Corp., Cleveland, Ohio

MACHINERY—Forming Wire
Baird Machine Co., Stratford, Conn.
Nilson, A. H., Machine Co., Bridgeport, Conn.
Wafios, Maschinenfabrik, Reutlingen 3, Wurtt., Germany

MACHINERY—Galvanizing Wire
Sleeper & Hartley, Inc., Worcester, Mass.
Steel Equipment Co., Cleveland, Ohio
Vaughn Machinery Co., Cuyahoga Falls, O.
Wean Equipment Corp., Cleveland, O.
Wilson, Lee, Engr. Co., Cleveland, Ohio

MACHINERY—Gang Winders
Entwistle, Jas. L. Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding
Norton Co., The, Worcester, Mass.

MACHINERY—Insulating Wire
Aetna-Standard Engineering Co., Pittsburgh, Pa.
American Insulating Mach'y Co., Phila., Pa.
Davis-Standard Sales Corp., Mystic, Conn.
Ets. Pourtier Frères, Romainville, France
Fidelity Machine Co., Inc., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Royle, John & Sons, Paterson, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Wardwell Braiding Mach. Co., Central Falls, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Knitting
Fidelity Machine Co., Inc., Philadelphia, Pa.

MACHINERY—Lacquering Electric Wire
American Insulating Mach'y Co., Philadelphia.
Cook Mfg. Co., The, Paterson, N. J.
Industrial Ovens, Inc., Cleveland, O.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Looms, Wire Weaving
Interlocking Fence Co., Morton, Ill.
Mummert-Dixon Co., Hanover, Pa.
Wafios, Maschinenfabrik, Reutlingen 3, Wurtt., Germany

MACHINERY—Material Handling
(See Material Handling Equipment)

MACHINERY—Measuring Wire & Cable
Davis Electric Co., Wallingford, Conn.
Durant Mfg. Co., Milwaukee, Wis.
New England Butt Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail and Tack
Baird Machine Co., The Stratford, Conn.
Glader, Wm., Machine Works, Chicago, Ill.
National Mach'y Exch. (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Wafios, Maschinenfabrik, Reutlingen 3, Wurtt., Germany

MACHINERY—Pickling
Chemsteel Construction Co., Pittsburgh, Pa.
Youngstown Welding & Eng'g Co., Youngstown, Ohio.

MACHINERY—Pin Making
Baird Machine Co., The, Stratford, Conn.
Cosa Corporation, New York, N. Y.

MACHINERY—Pointing
Aetna-Standard Engineering Co., Pittsburgh, Pa.
Morgan Construction Co., Worcester, Mass.
National Mach'y Exch. (Used), New York, N. Y.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury Conn.
Wean Equipment Corp., Cleveland, Ohio

MACHINERY—Poultry Wire Fencing
Interlocking Fence Co., Morton, Ill.
Wean Equipment Corp., Cleveland, O.

MACHINERY—Re-Spooling
Boyd & Sons Manufacturing Corp., Philadelphia, Pa.
Davis Electric Co., Wallingford, Conn.
Eisler Engineering Co., Newark, N. J.
Emory, Robert J., Co., Newark, N. J.
Mummert-Dixon Co., Hanover, Pa.
National Mach'y Exch. (Used), New York, N. Y.
Steel Equipment Co., Cleveland, Ohio
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.
Wean Equipment Corp., Cleveland, Ohio
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.
Wire Insulating Machy., Div. of Machinery Electrification, Inc., Northboro, Mass.

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

MACHINERY—Rod Mill
Morgan Construction Co., Worcester, Mass.
Schumag Schumacher Metallwerke, Aachen, Germany
Wean Equipment Corp., Cleveland, Ohio

MACHINERY—Rolling Mill
Morgan Construction Co., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Rubber Insulating
Davis-Standard Sales Corp., Mystic, Conn.
Royle, John & Sons, Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Spark Testing
Davis Electric Co., Wallingford, Conn.
Federal Manufacturing Co., Wallingford, Conn.
Peschel Electronics, Inc., New Rochelle, N. Y.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Spring Making
Carlson Company, The, New York, N. Y.
Lundahl Corp., Winsted, Conn.
National Mach'y Exch. (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Wafios, Maschinenfabrik, Reutlingen 3, Wurtt., Germany
Wells, Frank L., Co., Kenosha, Wisc.

MACHINERY—Staple
Sleeper & Hartley, Inc., Worcester, Mass.
Wafios, Maschinenfabrik, Reutlingen 3, Wurtt, Germany.

MACHINERY—Straightening & Cutting
Cosa Corporation, New York, N. Y.
Kilmer, M. D., & Co., Cleveland, Ohio
Lewis Machine Co., The, Cleveland, Ohio
Medart Co., The, St. Louis, Mo.
Mettler Machine Tool Co., New Haven, Conn.
National Mach'y Exch. (Used), New York, N. Y.
Wells, Frank L., Co., Kenosha, Wisc.

MACHINERY—Stranding
Haskell-Dawes Machine Co., Philadelphia, Pa.
Hughesville Machine & Tool Co., Hughesville, Pa.
Maillefer S. A., Renens-Lausanne, Switzerland.
Milton Machine Works, Inc., Milton, Pa.
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Studmaking
Cosa Corporation, New York, N. Y.

MACHINERY—Swaging
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Take-Up and Pay-Out
Aetna-Standard Engineering Co., Pittsburgh, Pa.
American Insulating Mach'y Co., Phila., Pa.
Davis Electric Co., Wallingford, Conn.
Davis-Standard Sales Corp., Mystic, Conn.
Ets. Pourtier Frères, Romainville, France
Federal Manufacturing Co., Wallingford, Conn.
Industrial Ovens, Inc., Cleveland, Ohio
New York Engineering Co., Yonkers, N. Y.
Standard Mill Supply Co., Pawtucket, R. I.
Watson Machine Co., Paterson, N. J.
Wire Insulating Machy., Div. of Machinery Electrification, Inc., Northboro, Mass.

MACHINERY—Taping
American Insulating Mach'y Co., Phila., Pa.
Ets. Pourtier Frères, Romainville, France
New England Butt Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Testing Magnet Wire Coatings for Pin Holes
Peschel Electronics, Inc., New Rochelle, N. Y.

MACHINERY—Testing, Physical
Lundahl Corp., Winsted, Conn.
Scott Testers, Inc., Providence, R. I.
Spring Mfgs. Supply Co., Plantsville, Conn.

MACHINERY—Tinning Wire
American Insulating Mach'y Co., Phila., Pa.
Cook Manufacturing Co., The, Paterson, N. J.
Steel Equipment Co., Cleveland, Ohio
Syncro Machine Co., Perth Amboy, N. J.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Tinsel Rolling Mills
American Insulating Mach'y Co., Phila., Pa.

MACHINERY—Trolley Wire
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill, Cold Drawing
Aetna-Standard Engineering Co., Pittsburgh, Pa.
Mettler Machine Tool, Inc., New Haven, Conn.

MACHINERY—Twinning
(See Mach.—Bunching)

MACHINERY—Twisters, Wire
Cook Manufacturing Co., The, Paterson, N. J.
Davis Electric Co., Wallingford, Conn.
Federal Manufacturing Co., Wallingford, Conn.
Haskell-Dawes Machine Co., Philadelphia, Pa.

MACHINERY—Used
National Machinery Exchange, New York, N. Y.
Wire & Textile Machy., Inc., Pawtucket, R. I.

MACHINERY—for Wire Welding
(See WELDERS—Butt and Spot)

MACHINERY—Washer Forming
Cosa Corporation, New York, N. Y.

MACHINERY—Winding Wire
Eisler Engineering Co., Newark, N. J.
Emory, Robert J., Newark, N. J.
Federal Manufacturing Co., Wallingford, Conn.
Mummert-Dixon Co., Hanover, Pa.
New England Butt Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.
Watson Machine Co., Paterson, N. J.
Wire Insulating Machy., Div. of Machinery Electrification, Inc., Northboro, Mass.

MACHINERY—Wire Bending
Eisler Engineering Co., Newark, N. J.
Kilmer, M. D., & Co., Cleveland, Ohio

MACHINERY—Wire Drawing
Aetna-Standard Engineering Co., Pittsburgh, Pa.
Cook Manufacturing Co., The, Paterson, N. J.
Herborn, Herborn, Germany
Morgan Construction Co., Worcester, Mass.
National Mach'y Exch. (Used), New York, N. Y.
Schumag Schumacher Metallwerke, Aachen, Germany
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Steel Equipment Co., Cleveland, Ohio
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, Ohio
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Wire Forming
Baird Machine Co., The, Stratford, Conn.
Cosa Corporation, New York, N. Y.
Kilmer, M. D., & Co., Cleveland, Ohio
National Mach'y Exch. (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Wire Rope
Milton Machine Works, Inc., Milton, Pa.
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Watson Machine Co., Paterson, N. J.

MACHINERY—Wrapping with Paper
Terkelsen Machine Co., Boston, Mass.

MATERIAL HANDLING EQUIPMENT—
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

MILLS—Tandem, Rolling & Edging
Wean Equipment Co., Cleveland, Ohio

NAIL TOOLING—Tungsten Carbide
Firth Sterling, Inc., Pittsburgh, Pa.
Pittsburgh Carbide Die Co., Monongahela, Pa.

NAILS—Wire
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Sheffield Steel Corp., Kansas City, Mo.
Wickwire Brothers, Inc., Cortland, N. Y.

NOZZLES—For Extruding Machines
Wire Tool Div., Bridgeport Jig Boring Co., Bridgeport, Conn.

OVENS—Cable Lacquering
American Insulating Mach'y Co., Phila, Pa.
Carl-Mayer Corp., The, Cleveland, Ohio
Industrial Ovens, Inc., Cleveland, Ohio
Morrison, John R., Industries, Inc., Cleveland, Ohio
Rockwell Co., W. S., Fairfield, Conn.

OVENS—Rod Bakers
Carl-Mayer Corp., The, Cleveland, Ohio
Morrison, John R., Industries, Inc., Cleveland, Ohio

OVENS—Welding Rod Coating
Carl-Mayer Corp., The, Cleveland, Ohio
Industrial Ovens, Inc., Cleveland, Ohio
Morrison, John R., Industries, Inc., Cleveland, Ohio

PAINT—Acid Proof
Ceilcote Company, Cleveland, Ohio

PAINT BONDING CHEMICALS—
American Chemical Paint Co., Ambler, Pa.

PAINTS—Heat Resisting
American Chemical Paint Co., Ambler, Pa.

PAPER—Creped Wrapping
National Waterproof Papers, Inc., Camden, N. J.
Terkelsen Machine Co., Boston, Mass.

PAPER—For Coil Wrapping and Corrosion Prevention
National Waterproof Papers, Inc., Camden, N. J.
Terkelsen Machine Co., Boston, Mass.

PATENT ATTORNEYS—
Lancaster, Allwine & Rommel, Washington, D. C.

PAY-OUT SYSTEMS—
(See MACHINERY—Take-Up & Pay-Out)

PHOSPHATE COATING CHEMICALS
(See COMPOUNDS—Phosphate Coating)

PICKLING COMPOUNDS—
See (Inhibitors—Pickling)

PICKLING—Hooks, etc. Acid Resisting
Youngstown Welding & Eng'g Co., Youngstown, Ohio

PICKLING TANK LININGS—
Chemsteel Construction Co., Pittsburgh, Pa.
Haveg Corp., Newark, Del.
Heil Process Equipment Corp., Cleveland, Ohio

PIPES & FITTINGS—Acid Resistant
Haveg Corp., Newark, Del.

PLASTICS—for Wire Insulation
Electronic Rubber Co., Stamford, Conn.

PLIERS—For Wire
Utica Drop Forge & Tool Corp., Utica, N. Y.

POTS—Lacquer
Industrial Ovens, Inc., Cleveland, Ohio

PRESSES—Hydraulic and Mechanical
Aetna-Standard Engineering Co., Pittsburgh, Pa.

PULLERS AND GRIPS—For Wire
Morgan Construction Co., Worcester, Mass.
Scudder, E. J. Fdry. & Mach. Co., Trenton, N. J.
Sjogren Tool and Machine Co., Auburn, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, Ohio
Wean Equipment Corp., Cleveland, Ohio

REEL AND TENSION STANDS—
Davis Electric Co., Wallingford, Conn.
Fidelity Machine Company, Inc., Philadelphia
Industrial Ovens, Inc., Cleveland, Ohio.
Kilmer, M. D., & Co., Cleveland, Ohio
Moslo Machinery Co., Cleveland, Ohio
New York Engineering Co., Yonkers, N. Y.
Roll-A-Reel, Cincinnati, Ohio
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Mill Supply Co., Pawtucket, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.
Wire Insulating Machy., Div. of Machinery Electrification, Inc., Northboro, Mass.

REEL CRUTCHES—
Roll-A-Reel, Cincinnati, Ohio
Watson Machine Co., Paterson, N. J.

REELS & SPOOLS—Aluminum Alloy
Acrometal Products, Inc., Minneapolis, Minn.
Hubbard Spool Co., Garrett, Ind.
Milton Machine Works, Inc., Milton, Pa.

REELS & SPOOLS—Annealing and Stranding
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Co., Garrett, Ind.
Milton Machine Works, Inc., Milton, Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Republic Steel Corp., Pressed Steel Div., Niles, Ohio

REELS—Metal Bound
Durkee Mfg. Co., Pine River, Minn.
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Co., Garrett, Ind.
McCaskie, Inc., Wm., Westport, Mass.

REELS—Plywood
Carris Reels, Inc., Rutland, Vt.
Hubbard Spool Co., Garrett, Ind.
McCaskie, Inc., Wm., Westport, Mass.
Nelson Company, The, Baltimore, Md.
Winchester Reel Co., Ashuelot, N. H.

REELS & SPOOLS—Steel (All Types)
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Clark, J. L. Mfg. Co., Rockford, Ill.
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Co., Garrett, Ind.
Mason Can Company, East Providence, R. I.
Milton Machine Works, Inc., Milton, Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New York Engineering Co., Yonkers, N. Y.
Republic Steel Corp., Pressed Steel Div., Niles, Ohio

REELS—Wire Mill
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Bridge Mfg. Co., The, Hazardville, Conn.
Carris Reels, Inc., Rutland, Vt.
Durkee Mfg. Co., Pine River, Minn.
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Co., Garrett, Ind.
Mason Can Company, East Providence, R. I.
McCaskie, Inc., Wm., Westport, Mass.

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

Mettler Machine Tool, Inc., New Haven, Conn.
Milton Machine Works, Inc., Milton, Pa.
Moslo Machinery Co., Cleveland, Ohio
Mossberg Pressed Steel Corp., Attleboro, Mass.
New York Engineering Co., Yonkers, N. Y.
Republic Steel Corp., Pressed Steel Div., Niles, Ohio
Winchester Reel Co., Ashuelot, N. H.

REELS & SPOOLS—Wooden
American Woodworking Co., Chicago, Ill.
Bridge Mfg. Co., Inc., The, Hazardville, Conn.
Carris Reels, Inc., Rutland, Vt.
Durkee Mfg. Co., Pine River, Minn.
Hubbard Spool Co., Garrett, Ind.
Nelson Company, The, Baltimore, Md.
Winchester Reel Co., Ashuelot, N. H.

REFRACTORIES—High Temperature
Norton Company, Worcester, Mass.

ROD BAKERS—
(See OVENS—Rod Bakers)

RODS—Stainless Steel
American Steel & Wire Co., Cleveland, Ohio
Crucible Steel Co. of America, Pittsburgh, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.

RODS—Steel
Crucible Steel Co. of America, Pittsburgh, Pa.

RODS—Wire—Non-Ferrous
Chase Brass & Copper Co., Waterbury, Conn.
Platt Bros. & Co., The, Waterbury, Conn.
Scovill Mfg. Co., Waterbury, Conn.

RODS—Wire, Steel
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Crucible Steel Co. of America, Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Sheffield Steel Corp., Kansas City, Mo.
Youngstown Sheet & Tube Co., Youngstown, O.

ROPE—Blocks
Madesco Tackle Block Co., Easton, Pa.

ROPE—Wire
American Steel & Wire Company, Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Roebling's, John A. Sons Corp., Trenton, N. J.

RUST PROOF COMPOUNDS—
(See COMPOUNDS—Rust Preventing)

RUST REMOVING COMPOUNDS—
(See COMPOUNDS—Rust Preventing)

SALTS—Heat Treating, Descaling, etc.
Holden, A. F., Co., The, Detroit, Mich.

SATURATION SYSTEMS—
Industrial Ovens, Inc., Cleveland, Ohio
New York Engineering Co., Yonkers, N. Y.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

SOAPS—Industrial and Wire Drawing
(See COMPOUNDS—Wire Drawing)

SODIUM—for Descaling
du Pont de Nemours & Co., Inc., E. I., Wilmington, Del.
Holden, A. F., Co., The, Detroit, Mich.

SPOOLS—(See Reels & Spools)

SPOOLS—Stamped Metal for Retail Wire Sales
Clark, J. L. Mfg. Co., Rockford, Ill.
Mason Can Co., East Providence, R. I.

STAMPINGS—Steel
Acrometal Products, Inc., Minneapolis, Minn.
Mossberg Pressed Steel Corp., Attleboro, Mass.

STRIP—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Roebling's, John A. Sons Corp., Trenton, N. J.
Youngstown Sheet & Tube Co., Youngstown, O.

STRIPPERS—Wire, Electric
Utica Drop Forge & Tool Corp., Utica, N. Y.

TANKS—Compound
New York Engineering Co., Yonkers, N. Y.
Watson Machine Co., Paterson, N. J.

TANKS—Pickling and Plating
Ceilcote Company, Cleveland, Ohio
Chemsteel Construction Co., Pittsburgh, Pa.

TESTERS — INSULATION
(See MACHINERY—Spark Testers)

TESTING EQUIPMENT
(See MACHINERY Testing, Physical and Diameter Testing)

TESTING EQUIPMENT—Springs
Spring Mfgs. Supply Co., Plantsville, Conn.

TINNING PROCESS—
Metal & Thermit Corp., New York, N. Y.

TINSEL—Electric Conductor
Montgomery Co., The, Windsor Locks, Conn.

TINSEL WIRE—Resistance, Lame, Decorative Cords Thread—Bare Copper, Silver and False Gold Coated, etc.
(See TINSEL—Electric Conductor)

TOOLS—Nail Machine
Pittsburgh Carbide Die Co., Monongahela, Pa.

TOOLS—Spring Forming
Lundahl Corp., Winsted, Conn.
Spring Mfgs. Supply Co., Plantsville, Conn.

TOOLS—Welding Wire, Strip & Foil (Pressure)
Utica Drop Forge & Tool Corp., Utica, N. Y.

TOOLS—Wire Cutting
Porter, H. K. Inc., Somerville, Mass.
Utica Drop Forge & Tool Corp., Utica, N. Y.

TRAMRAIL SYSTEMS—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

TRANSMISSIONS—Variable speed (See Machy—Power Transmission)

TRAVERSES & DRUMS—For Reels
Drums & Traverses (See Drums & Traverses)

TRAVERSE MECHANISMS—
Apco Mossberg Co., Attleboro, Mass.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.
Wire Insulating Machy., Div. of Machinery Electrification, Inc., Northboro, Mass.

TUBE BENDERS AND FORMERS—
Kilmer, M. D., & Co., Cleveland, Ohio

VALVES & FITTINGS—Acid Resistant
Haveg Corp., Newark, Del.

VARNISHES—for Electric Wire
N. E. Lacquer Co., E. Providence, R. I.

VULCANIZING PANS AND EQUIPMENT—
American Insulating Mach'y Co., Phila., Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Wire Insulating Machy., Div. of Machinery Electrification, Inc., Northboro, Mass.

WELDERS—Spot and Butt
Eisler Engineering Co., Newark, N. J.
Hoffman Co., Robt. W., Chicago, Ill.
Micro Products Co., Chicago, Ill.
Utica Drop Forge & Tool Corp., Utica, N. Y.

WIRE—Aluminum
Elmet Division, North American Philips Company, Inc., Lewiston, Maine
Malin & Co., The, Cleveland, Ohio
Scovill Mfg. Co., Waterbury, Conn.
Seneca Wire & Manufacturing Co., Fostoria, O.

WIRE—Barbed
Interlocking Fence Co., Morton, Ill.

WIRE—Brass
Chase Brass & Copper Co., Waterbury, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Spencer Wire Corp., Union, N. J.

WIRE—Brush
Spencer Wire Corp., Union, N. J.

WIRE—Bunched & Stranded, Copper
Camden Wire Co., Camden, N. Y.

WIRE—Cast
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Cold Heading
American Steel & Wire Co., Cleveland, Ohio
Bethlehem Steel Co., Bethlehem, Pa.
Camden Wire Co., Camden, N. Y.
Chase Brass & Copper Co., Waterbury, Conn.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind
Crucible Steel Co. of America, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Scovill Mfg. Co., Waterbury, Conn.
Seneca Wire & Manufacturing Co., Fostoria, O.
Sheffield Steel Corp., Kansas City, Mo.
Wickwire Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Copper
Chase Brass & Copper Co., Waterbury, Conn.
Spencer Wire Corp., Union, N. J.

WIRE—For Electrical Conductors
Camden Wire Co., Camden, N. Y.

WIRE—Flat, Fine
Elmet Division, North American Philips Company, Inc., Lewiston, Maine
Montgomery Co., The, Windsor Locks, Conn.

WIRE—Galvanized
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Roebling's, John A. Sons Corp., Trenton, N. J.
Sheffield Steel Corp., Kansas City, Mo.
Wickwire Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Manufacturers
American Steel & Wire Co., Cleveland, Ohio
Bethlehem Steel Co., Bethlehem, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
Continental Steel Corp., Kokomo, Ind.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Crucible Steel Co. of America, Pittsburgh, Pa.
Johnson Steel & Wire Co., Worcester, Mass.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
National Lock Washer Company, The, Newark, N. J.
North American Philips Co., Inc., Elmet Division, Lewiston, Me.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J.
Scovill Mfg. Co., Waterbury, Conn.
Seneca Wire & Manufacturing Co., Fostoria, O.
Sheffield Steel Corp., Kansas City, Mo.
Spencer Wire Corp., Union, N. J.
U. S. Steel Co., N. Y., N. Y.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Music
American Steel & Wire Co., Cleveland, Ohio
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Malin & Co., The, Cleveland, Ohio
Seneca Wire & Manufacturing Co., Fostoria, O.
Spencer Wire Corp., Union, N. J.

WIRE—Nickel Silver and Phosphor Bronze
Chase Brass & Copper Co., Waterbury, Conn.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Malin & Co., The, Cleveland, Ohio

WIRE—Oil Tempered
Crucible Steel Co. of America, Pittsburgh, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J.
Sheffield Steel Corp., Kansas City, Mo.

WIRE—Silver Plated Copper
Camden Wire Co., Camden, N. Y.

WIRE—Special Shapes
Crucible Steel Co. of America, Pittsburgh, Pa.
Continental Steel Corp., Kokomo, Ind.
National Lock Washer Company, The, Newark, N. J.

WIRE—Spring
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Crucible Steel Co. of America, Pittsburgh, Pa.
Johnson Steel & Wire Co., Inc., Worcester.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J.
Seneca Wire & Mfg. Co., Fostoria, Ohio
Sheffield Steel Corp., Kansas City, Mo.
Wickwire Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Stainless Steel
American Steel & Wire Co., Cleveland, Ohio
Crucible Steel Co. of America, Pittsburgh, Pa.
Firth Sterling, Inc., Pittsburgh, Pa.
National Lock Washer Company, The, Newark, N. J.
Pittsburgh Steel Co., Pittsburgh, Pa.

WIRE—Steel—Also Coppered and Galvanized Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Crucible Steel Co. of America, Pittsburgh, Pa.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J.
Seneca Wire & Mfg. Co., Fostoria, Ohio
Sheffield Steel Corp., Kansas City, Mo.
Spencer Wire Corp., Union, N. J.
U. S. Steel Export Co., New York, N. Y.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O

WIRE—Straightening and Cutting
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Tinned Copper
Camden Wire Co., Camden, N. Y.

WIRE—Tungsten
North American Philips Co., Inc., Elmet Division, Lewiston, Me.

WIRE—Zinc
Platt Bros. & Co., The, Waterbury, Conn.

WRAPPING PAPER—Creped
(See PAPER—Creped Wrapping)

YARNS & TAPES—Insulating
Celanese Corporation of America, New York, N. Y.
Glass Fibers, Inc., Toledo, Ohio
Heineman Corp., Oscar, Chicago, Ill.
Libbey-Owens-Ford Glass Co., Fiber Glass Div., Toledo, Ohio.

YARN TESTERS—
Scott Testers, Inc., Providence, R. I.

The WATSON MACHINE COMPANY

ESTABLISHED 1845

PATERSON 3, NEW JERSEY, U. S. A.

ELECTRICAL WIRE AND CABLE, WIRE ROPE, CORDAGE
AND MASTICATING MACHINERY MANUFACTURERS

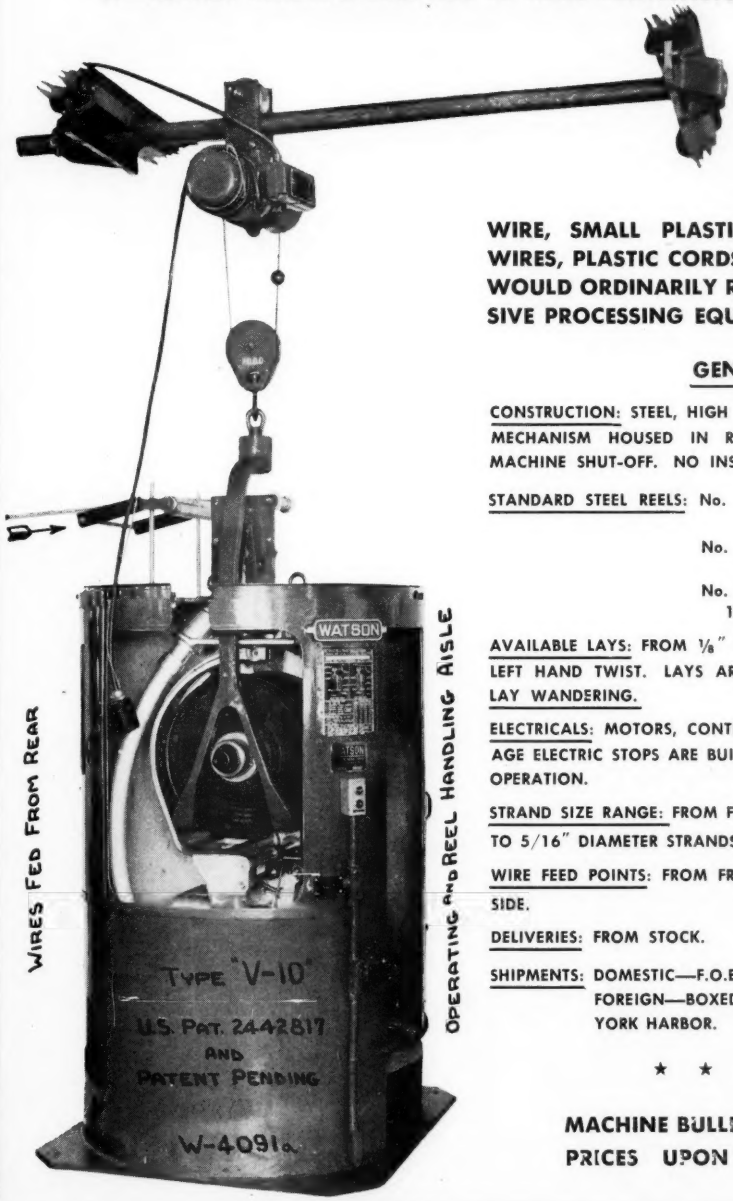
WATSON

VERTICAL BUNCHERS TYPE "V"

THE LEADING DESIGNS WITH AN INTERNATIONAL REPUTATION

NOTABLE ADVANTAGES:

1.—HIGHEST LONG-RUN OUTPUT ON LARGE STANDARD WIRE REELS.
2.—GREATEST COMPACTNESS. IDEAL FOR ROW GROUPING IN LIMITED SPACE.
3.—LABOR-SAVING. ONE OPERATOR CAN SERVE MANY MACHINES.
4.—QUICKEST PARTS SERVICE FROM CATALOGUED STOCK.
5.—LOWEST MACHINE COST DUE TO MASS MANUFACTURE.



SUITABLE FOR ALL COMMON BUNCHING WORK, AND USED ALSO FOR BUNCH-STRANDING AND CABLING OF STEEL AND ALUMINUM CLOTHESLINE, TELEVISION GUY WIRE, SEALING STRANDS, METAL FISH LINES, PAPER CORD, CONTINUOUS TWISTS OF FLAT WIRE, SMALL PLASTIC INSULATED CABLES, ANNUNCIATOR WIRES, PLASTIC CORDS, AND MANY OTHER PRODUCTS WHICH WOULD ORDINARILY REQUIRE THE USE OF MUCH MORE EXPENSIVE PROCESSING EQUIPMENT.

GENERAL SPECIFICATIONS

CONSTRUCTION: STEEL, HIGH STRENGTH ALLOYS AND BALL BEARING THROUGHOUT. MECHANISM HOUSED IN RIGID STEEL FRAME WITH SAFETY DOOR OPENING MACHINE SHUT-OFF. NO INSTALLATION WORK REQUIRED.

STANDARD STEEL REELS: No. 7—16″ x 8″, 250 LB. CU. CAPACITY
No. 9—22″ x 11″, 650 LB. CU. CAPACITY
No. 10—24″ x 14″, 1000 LB. CU. CAPACITY

AVAILABLE LAYS: FROM 1/8″ TO 4 7/8″. RIGHT AND LEFT HAND TWIST. LAYS ARE FIXED AS SET. NO LAY WANDERING.

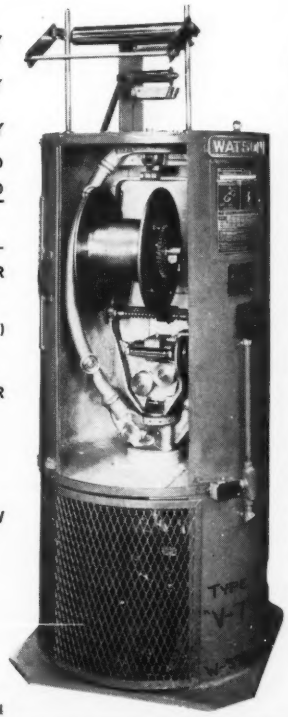
ELECTRICALS: MOTORS, CONTROLS AND LOW VOLTAGE ELECTRIC STOPS ARE BUILT IN AND WIRED FOR OPERATION.

STRAND SIZE RANGE: FROM FINE (7 x #30 B. & S.) TO 5/16″ DIAMETER STRANDS.

WIRE FEED POINTS: FROM FRONT, REAR OR EITHER SIDE.

DELIVERIES: FROM STOCK.

SHIPMENTS: DOMESTIC—F.O.B. PATERSON, N. J.
FOREIGN—BOXED & DELIVERED TO NEW YORK HARBOR.



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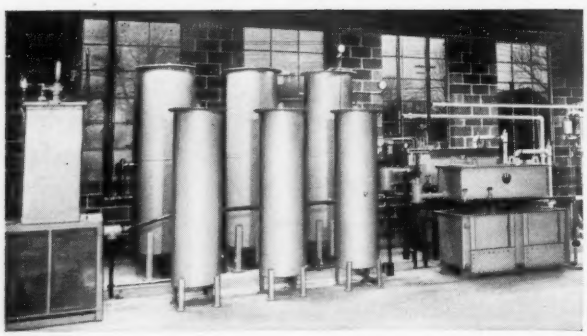
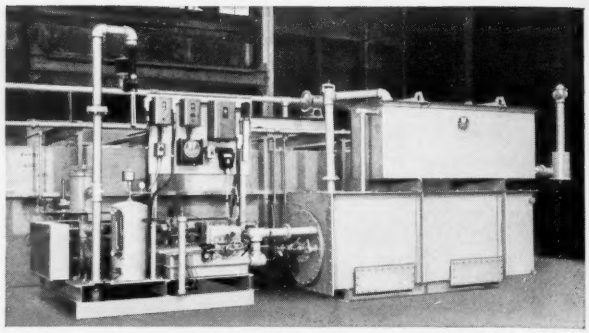
MACHINE BULLETINS AND PRICES UPON REQUEST

5-54



An EF installation consisting of a 1500 and a 3000 cfh exothermic horizontal water cooled type special atmosphere unit, each with desulphurizing towers and refrigerators for bright annealing steel and copper, and clean annealing brass.



An EF kerosene exothermic gas generator. These are also built in several sizes and types for producing special atmospheres for use in bright annealing copper and steel products in areas where fuel gases are not available.

EF SPECIAL ATMOSPHERE EQUIPMENT

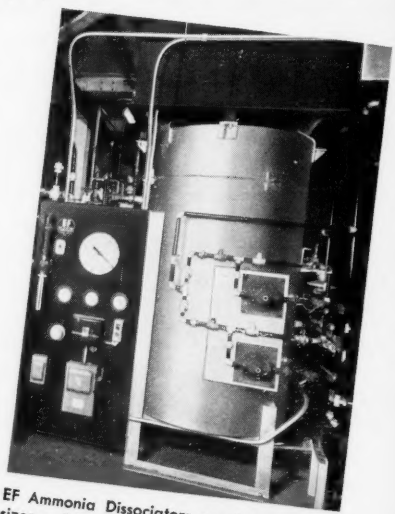
For any Heat Treating Process . . . any Capacity

Long Experience = High Efficiency + Low Maintenance

Gas scrubbing units are available in several sizes and types for use with EF special atmosphere generating equipment where it may be necessary to remove CO_2 or H_2S.

• As pioneers in the development and use of equipment for producing low cost special atmospheres, we are in position to furnish a wide range of reliable, thoroughly tested special atmosphere units, including endothermic and exothermic gas generators, ammonia dissociators, refrigerators, dryers, desulphurizers, gas scrubbing units and other special atmosphere equipment — equipment with a reputation for high efficiency,— and low maintenance and operating costs.

Submit your furnace or special atmosphere problems to experienced engineers — *IT PAYS*

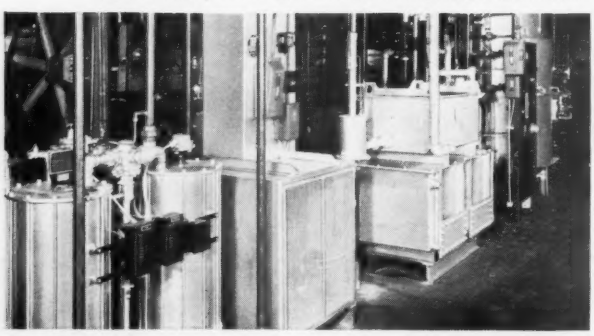


EF Ammonia Dissociators are built in many sizes and types for producing highly reducing atmospheres as required for bright annealing stainless; and other annealing and normalizing processes and preventing decarburization.

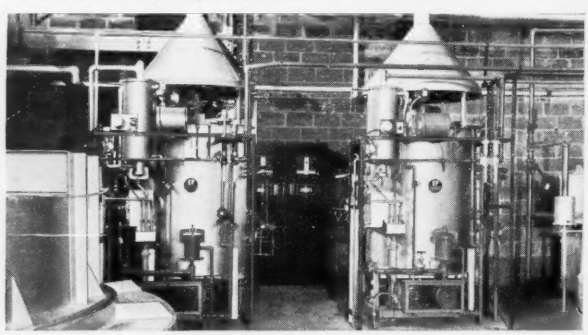
THE ELECTRIC FURNACE CO.

WILSON ST. at PENNA. R.R. *Salem - Ohio*

GAS FIRED, OIL FIRED AND ELECTRIC FURNACES FOR ANY PROCESS, PRODUCT OR PRODUCTION



EF special atmosphere installation consisting of an exothermic generator, refrigerator and dryer as used with EF furnaces for bright and clean annealing ferrous and non-ferrous products.



An installation consisting of two small EF oil fired endothermic generators producing special atmospheres from propane for carburizing and other processes.